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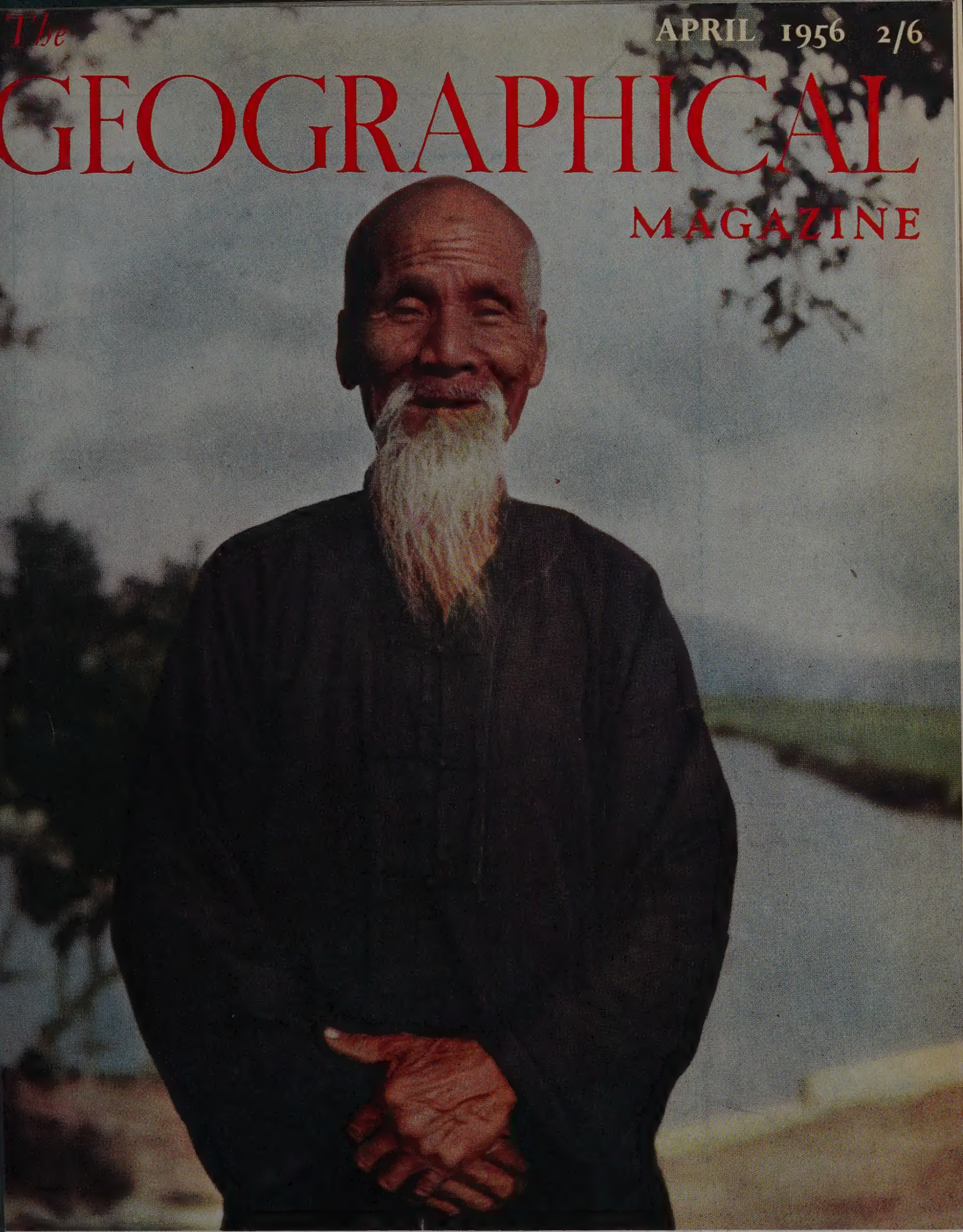
The GEOGRAPHICAL MAGAZINE



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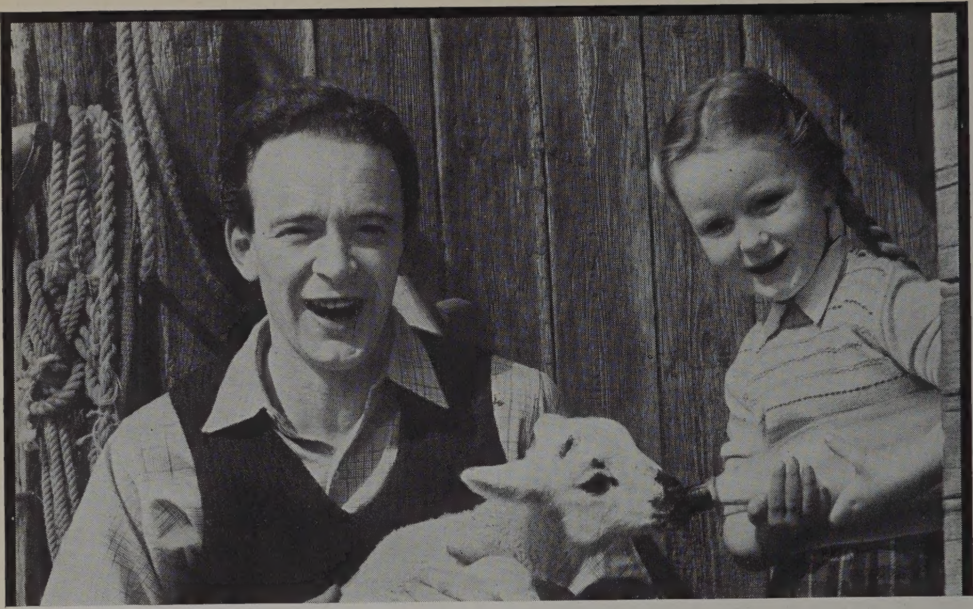

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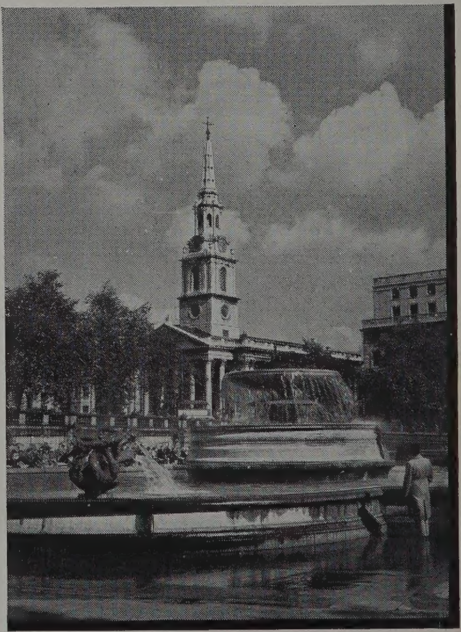

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Kwinana: Australia's New Oil Refinery

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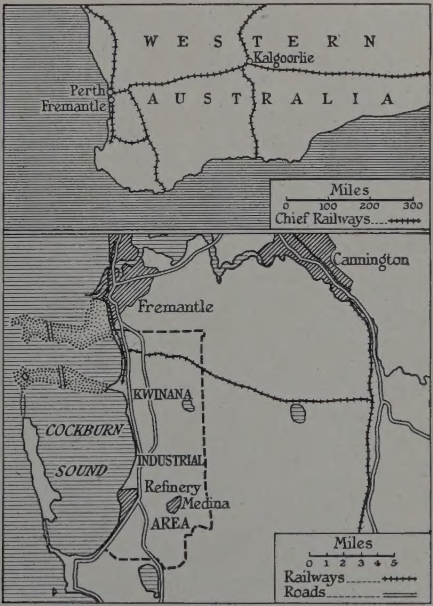
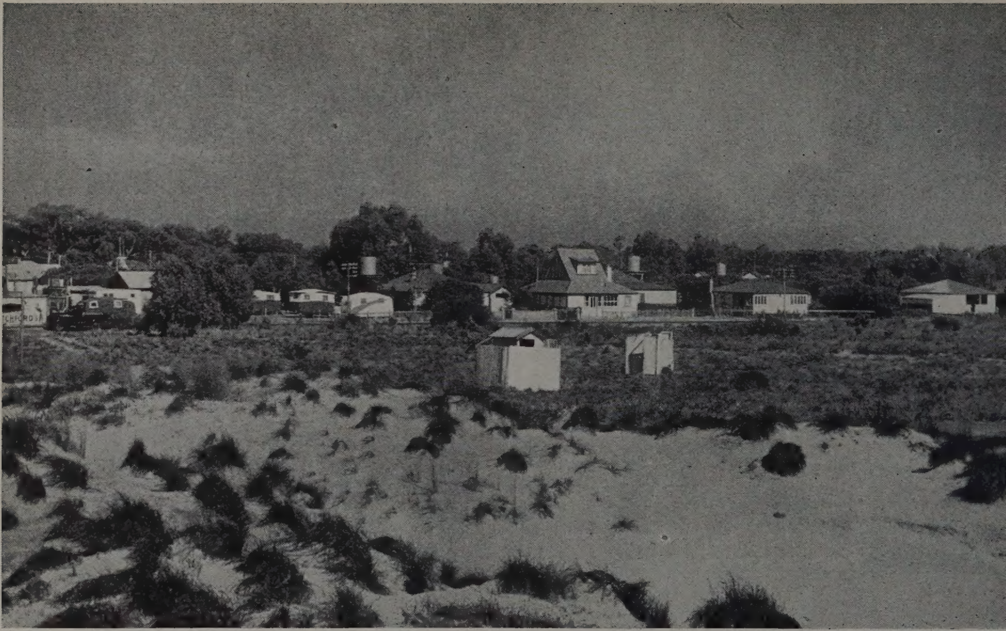
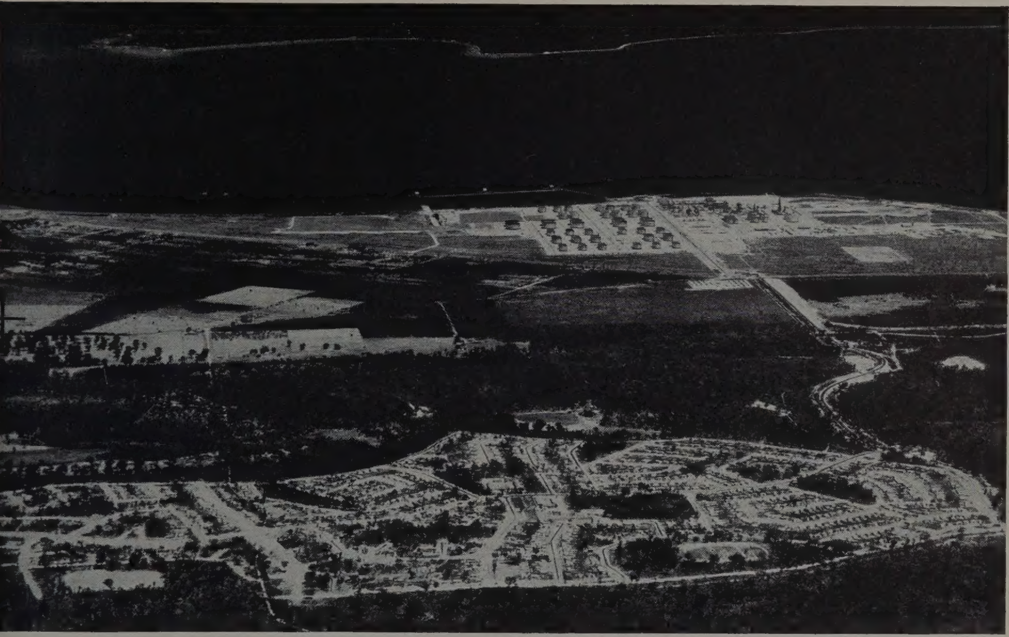
The history of exploration abounds in references to the work of commercial companies: the Muscovy Company, the Hudson's Bay Company, the East India Company; and even if there is little of the world left to 'explore' in the traditional sense of the word, much remains to be opened up. In both respects the great oil companies of today are true descendants of those earlier venturers: in the search for oil, whether it be in New Guinea or Arabia; and in the installation of vast refineries, the modern equivalent of their predecessors' 'factories'. Kwinana, twelve miles south of Fremantle, is the site of a new refinery built at a cost of £3,000,000 by the British Petroleum Company for an associate, the Australasian Petroleum Refinery Limited. Opened in 1955, it is the largest in Australasia. When fully working it will process 3,000,000 tons a year of crude oil from the Middle East for use in Australia and New Zealand as petrol, kerosine, diesel and fuel oils. (Above) *The furnaces of one of two atmospheric distillation plants in which the crude oil is heated before it is distilled*



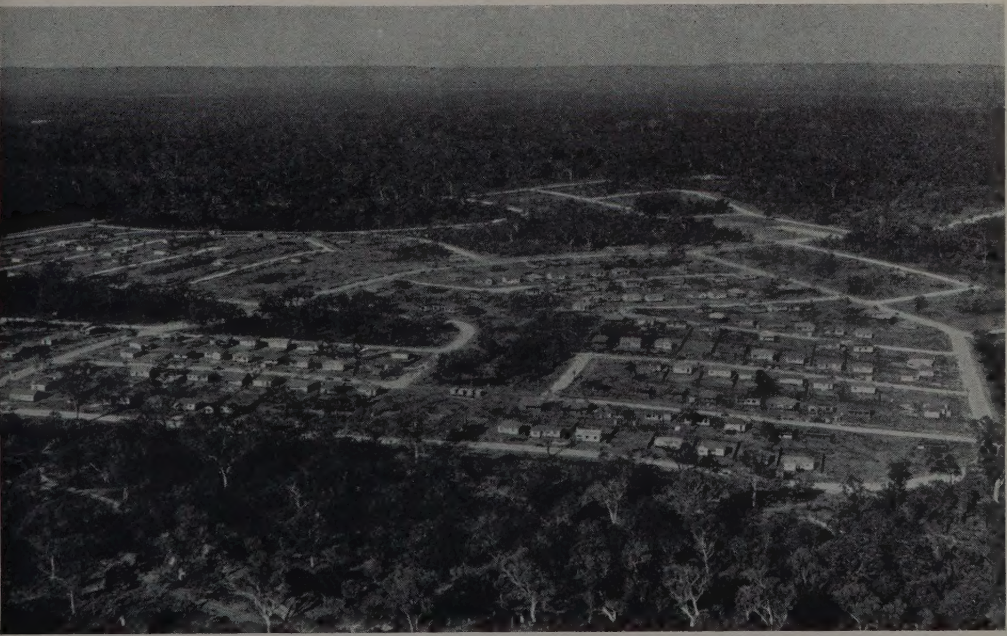
A. J. Thornton

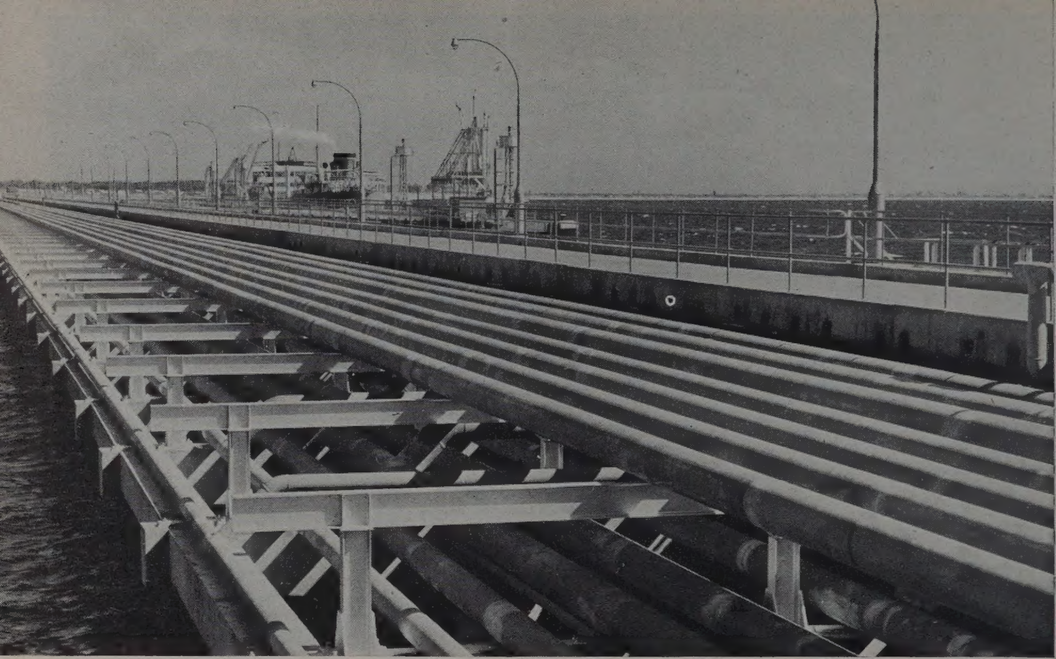


The 950-acre site chosen for the new refinery is on the almost landlocked shore of Cockburn Sound which has been described as the best anchorage on the western coast of Australia. The Government of Western Australia has undertaken to dredge a deep channel through the sandbanks at the entrance

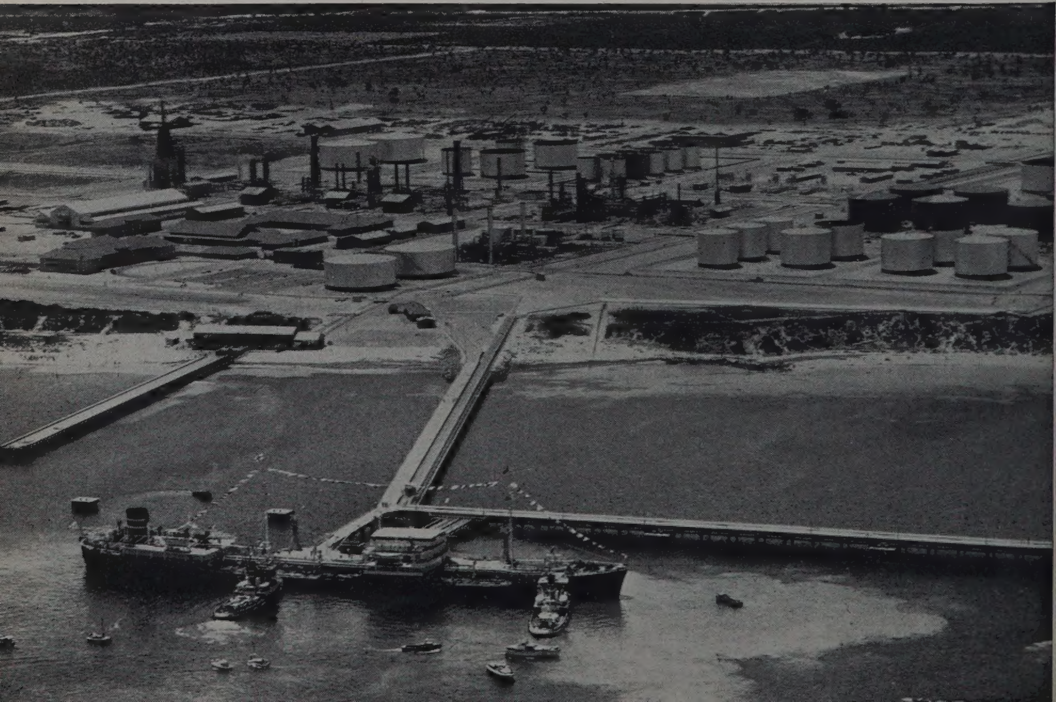


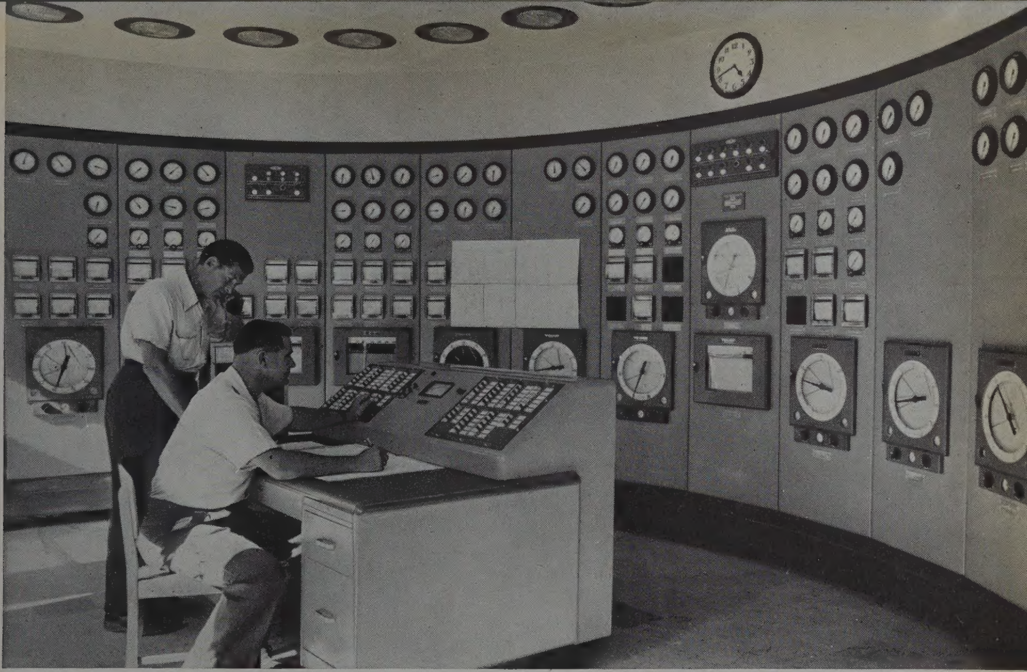
The Western Australia State Housing Commission is developing a township at Medina a couple of miles inland of the refinery to house employees and other workers, with shops, theatre, community hall, schools and a hotel. A second neighbourhood unit called Calista is being built alongside Medina





There is deep water close inshore in Cockburn Sound where an oil port has been built to serve the Kwinana Refinery. It consists of an L-shaped jetty with a 1000-foot shore arm and an 1800-foot sea arm, capable of receiving three of the largest tankers at once. Each berth has an independent pipe system





(Above) *The main control room in a distillation plant.* (Below) *One of the two seventeen-mile-long pipelines laid from Kwinana to the docks at Fremantle; one carries fuel oil for the ships at that port; the other motor spirit for distribution in Western Australia. Over half the products will go by sea*

(Above) *The modern and attractive shopping centre at Medina.* (Below) *A kindergarten and a twelve-acre site for schools for older children have been provided as well as nurseries, playgrounds and other amenities. The Kwinana Refinery is intended to have about a thousand employees when in full production*

The High Country of Yosemite

by ROBERT S. WOOD

A short journey in space can suggest a long one in geological time. The author depicts the evolution of peaks and lakes as it shows itself to the seeing eye in the High Sierras of California

After a two-hour climb from Yosemite Valley our little car crawled over the last steep grade and descended into Tuolumne Meadows. This alpine valley, set in the heart of California's Sierra Nevada Range at an altitude of 8600 feet, lies 150 miles due east of San Francisco on the Tioga Pass road. From here the sierra crest wanders 180 miles to the south before it is again crossed by a road.

My companion and I had planned a back-packing journey into the high country of Yosemite National Park to revisit a region we had enjoyed ten years earlier. We drove past the store and the public camp-ground bustling with tents and trailers, and took a side road along the peacefully flowing river to Tuolumne Lodge. The Lodge is one of several summer camps providing canvas cabins and a dining-room for high sierra visitors. All facilities are jointly operated by government and private enterprise and are open to the public.

We made reservations for dinner and drove back across the meadow to a log cabin housing the summertime keeper of the Sierra Club Lodge. While we questioned the keeper as to conditions in the high country, a vivid alpenglow settled over the valley and storm-clouds gathered ominously along the distant sierra crest. Although it was mid-July the season had been late and the road had been ploughed free of snow only two weeks before.

After picking a comfortable camp-site near the keeper's cabin we returned to the lodge for dinner. In the large dining-room we sat down to long, planked wooden tables, set family style, and were served a huge meal by uniformed college girls on holiday. When dinner was over we drove back across the quiet valley past hundreds of camp-fires flickering through the trees. The black sky was filled with stars when we climbed into our down sleeping-bags.

Breakfast was cooked on a small rock fire-place before the sun had fully lighted the meadows. After carefully measuring out a week's supply of food we followed the trail down to a foot-bridge spanning the Tuolumne River. For nearly a mile we wandered through a lush growth of short-grass meadow and tiny wild flowers sprouting out of the granite sand. Last year's dead grass still covered the ground where snow-water had not yet washed it away.

Average snowfall in this area runs from thirty to sixty feet annually, covering the ground for eight months of the year. During the Pleistocene Age these meadows were the centre of the great Tuolumne Icefield that supplied the Tenaya and Merced glaciers which in turn converged to quarry the well-known Yosemite Valley. Evidence of glaciation in the meadows is everywhere displayed in polished granite slopes and domes. Tuolumne Meadows was once a glacially excavated lake dammed by moraines and fed by the receding glaciers and icefields of its watershed. Slowly, however, vast quantities of sediment were washed down from the rapidly eroding peaks and the lake became a pond, then a swamp, and finally the present-day meadow with its meandering stream. Lodgepole pine, virtually the only conifer to be found in the region, has followed the drying ground down the hillsides and may one day turn the meadow into a firm-floored forest.

The trail soon started to climb beside Rafferty Creek, a tributary of the main river. A maze of dusty "switchbacks" (zigzag paths) carried us through the fringe of lodgepole pines that covered all but the bare rock from meadow to timberline. We entered a narrow meadow valley studded with boulders that had been carried along and deposited by a glacier during the Great Ice Age. As we came out of the brushless, needle-carpeted forest a pair of fat does, who had been chewing on succulent willow growing along the stream bank, disappeared gracefully into the woods while a number of picket-pin gophers rocketed back down their holes to await our departure.

Sounds of running water filled the little valley. Icy rivulets laced the meadow, pouring water from shaded snow-banks downhill to Rafferty Creek. Here, just below timberline, at 9500 feet, spring, summer, and autumn are compressed into four short months when the ground is free of snow. Aspect and altitude often produce entirely different seasons only a few yards or a few hours apart in this rapidly awakening land.

At the end of the valley we mounted another system of switchback paths coming out of the thinning forest into a sloping valley containing great stretches of glacially polished granite. The ice-flow that swept this slope rubbed a high sheen onto the speckled rock. A great deal of the glacier polish has been covered with earth and boulders or eroded away, but there are still vast stretches that remain intact.

Giant cumulus clouds were gathering as we trudged up the bare valley leading to Tuolumne Pass. A light wind was beginning to blow when we left the shelter of the forest, carrying the shadows of clouds across the darkening valley with ever-increasing frequency. Suddenly the sky was black. We hurried into a dry ravine and stored our packs in a sheltered pocket, then raced into the lee of a fallen trunk as the storm broke. Rain poured through the rapidly chilling air and turned to a pelting hail of marble-sized stones. Lightning stabbed the bare granite and thunder boomed among the crags, dying to a faint echo in the distant canyons. A dead lodgepole pine standing upstream was suddenly struck by lightning and exploded in a flash of blue smoke, throwing limbs and debris in all directions.

After twenty minutes the deluge subsided and the sunlight poured through a rift in the rapidly disappearing clouds. The ground was white with hailstones when we retrieved our wet packs and set out again. By the time we reached Tuolumne Pass at 10,100 feet all signs of the storm had disappeared. Flash storms of this sort are local phenomena in a range that makes its own weather. High sierra summers are remarkably dry—the scant rain-clouds of the California summer are usually wrung dry long before reaching the sierra peaks.

A chill wind was blowing when we arrived at the stunted group of lodgepoles that marks the watershed between the Tuolumne and Merced river-basins. These are divided by the Cathedral Range, one of a number of linear ranges supported on the broad block of the Sierra Nevada. This range runs more than ten miles from Tuolumne Meadows to the main sierra crest. In the California central valley the Merced and Tuolumne Rivers converge into the San Joaquin, which joins the Sacramento River to flow out through the Golden Gate at San Francisco.

Half a mile below us across the pass Boothe Lake lay nestled against a fractured granite wall of jointed blocks. We made our way through an almost treeless meadow dotted with lupin and Indian paint-brush to a comfortable camp-site on a tongue of land sticking into the lake. The calm waters of Boothe Lake offer an unusual variety of trout. An hour of fishing provided us with enough rainbow, lake and Eastern Brook trout to last through dinner and breakfast.

A little before dawn we were awakened by a clattering of pots and pans. A fat doe and two yearling bucks had been prospecting our cooking area for scraps, and the doe had gotten her head stuck while licking out our soup-pot. She vaulted crazily about the meadow, shaking her pot-covered head and snorting. The two bucks stood watching solemnly while the bewildered doe attempted to extricate herself. After five minutes of hilarious entertainment we watched her finally shake the pot loose and bound away up the slope to regain her dignity.

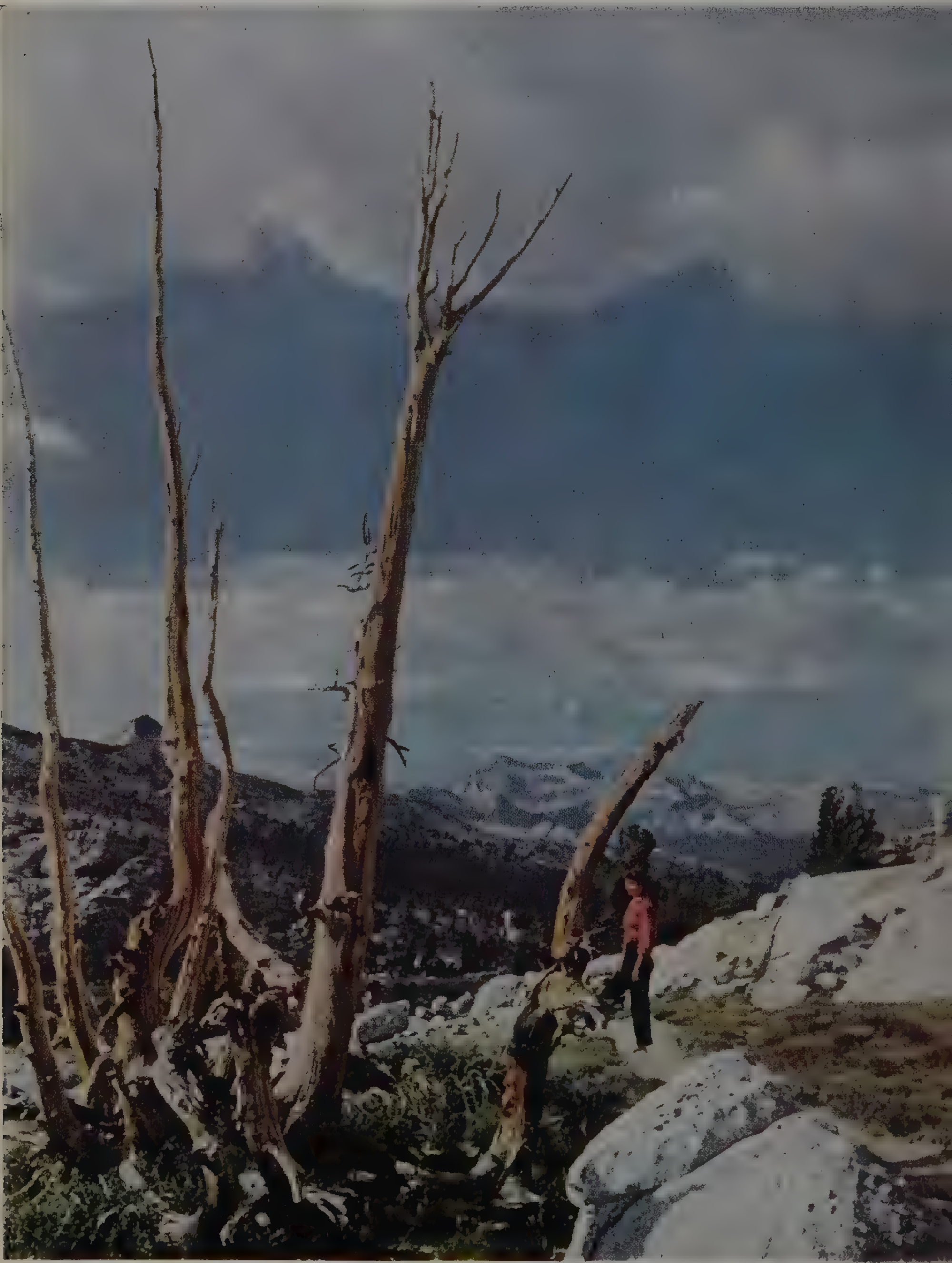
Little fingers of ice jutted out along the motionless surface of the lake as we got up to start breakfast. The air was slowly warming when we left Boothe Lake and climbed onto a small plateau that sits above Tuolumne Pass at the foot of massive Mount Fletcher. Here, tucked underneath the towering peak of gleaming white granite, lies Vogelsang, another of the high sierra summer camps, at an altitude of 10,200 feet. Canvas cabins with steel frames and concrete floors accommodate approximately sixty people. Supplies are brought seven miles by mule-train from Tuolumne Meadows.

We shed our packs and started along the plateau, carrying only lunch and fishing gear. A hundred yards above the camp sits Fletcher Lake at the mouth of a canyon that leads into the heart of the Cathedral Range. This lake is rapidly filling with sediment that washes down from the land above, adding to its sand-bar delta. At one time both rainbow and brook trout were plentiful here, but heavy fishing and the silting-in of breeding-grounds and shelter have turned it from a lively fishing-ground into a rapidly filling, shallow pool.

All Kodachromes by the author

While storm-clouds gather along the sierra crest in the background the Tuolumne River flows peacefully under an old bridge through the Tuolumne Meadows, 8600 feet high in the centre of California's famous Yosemite National Park. The Meadows are the usual point of entry for visitors to the high country

The view from a group of weatherbeaten lodgepole pines near Vogelsang Camp towards the glacially worn slopes of Tuolumne Pass, across the windy ridge between the Tuolumne and Merced river-basins



Through a clump of summer lupins Rafferty Creek cascades down a succession of wooded valleys to join the main river near Tuolumne Meadows, seven miles away. In the distance the backbone of the Sierra Nevada range rises above the pine forests that blanket the slopes of Yosemite National Park

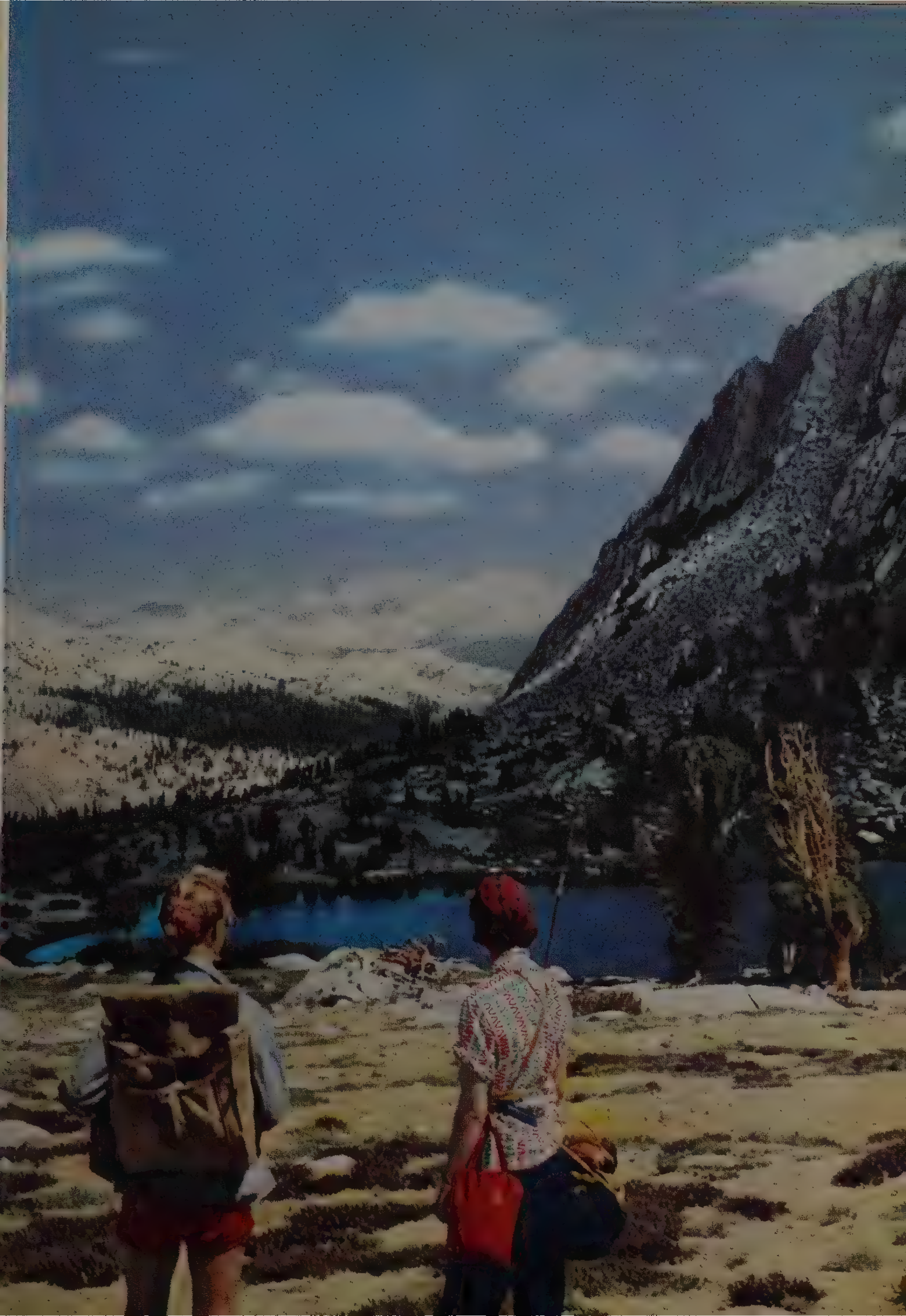
At the end of the lake a bubbling stream splashing through a thicket of willow led up a grassy slope spotted with snow-banks and wild flowers. We followed a series of glacially cut steps to the outlet of Townsley Lake in the canyon proper. This lake contains the rare and beautiful golden trout, native to a small group of lakes in the southern sierra. The golden has been introduced extensively in the high country but can survive only in the highest inhabitable waters, usually above 10,000 feet, and then only when it is not crowded out by more aggressive breeds. It is said that the golden trout must be seen to be caught because it will not strike but rather sucks in its food. Rarely will a golden hook itself. I watched my companion expertly place a Royal Coachman dry fly on the ruffled water of a little pool. A bolt of canary yellow flashed out of a crevice and the fly disappeared in a tiny swirl. My friend set the hook, then worked the frantically jumping little fighter in to the bank. When the wind died, putting the trout down, we worked our way to the head of the lake.

The elevation here is more than 10,300 feet which is timberline in this region. On the canyon walls above the lake misshapen, gnarled lodgepole, white-bark, and foxtail pines live a precarious life in the shelter of boulders and cliffs, often growing horizontally along the ground like enormous trunked hedges. A few relatively normal lodgepoles live along the grassy northern shore of the lake in earth deposited by the inlet stream. Townsley is a much younger lake in the pattern of evolution than is Fletcher, but here too silt from further up the canyon is continually dumped against the northern shore, gradually widening the fringe of grass lying between bare rock and the lake surface.

At the head of the lake the stream climbed

(Opposite) *In the chill quiet of early morning not a breath of air disturbs the still surface of Boothe Lake, now free of even the widening circles left by rising trout. The little lake lies in a sheltered pocket just to the west of Tuolumne Pass at 10,000 feet. It feeds Fletcher Creek which joins the Merced River to flow through Yosemite Valley, twelve miles to the west. Large quantities of sand and sediment have been washed into the basin of the lake to form a spongy meadow where once was open water.* (Right) *In a sheltered hollow in the lee of Vogelsang High Sierra Camp, 10,200 feet up, the bubbling waters of Fletcher Creek wind lazily through lush meadowland studded with flowers and shaded with lodgepole pine, though almost on the timberline. Brook trout lie beneath the overhanging river-banks, and foraging deer and bear are often found here.* (Below) *Cooking a meal while camping in the high sierras. Potatoes are frying in a square aluminium skillet balanced in front of the rock fireplace. Hanging from a green willow branch over the flames, a pot of cinnamon-flavoured apple-sauce simmers under the cook's watchful eye. In order to lighten the packs most of the food carried is dehydrated*

(Left) *Peering into the depths of Hanging Basket Lake from a perch high on the canyon wall. Beyond and almost directly beneath this glacially scooped tarn, in the bottom of the canyon, lies Lake Townsley. Hanging Basket Lake occupies a deep notch cut out of the precipitous canyon wall by either a residual glacier from the last Great Ice Age or a small glacier born during a 'little ice age' which reached its climax no more than a hundred years ago.* (Below) *In the talus-choked canyon above Townsley Lake lies a circular blue tarn called Lake Victorwood. Set in a glacially carved hollow and filled by the melting ice and snow, this deep young lake has not a single blade of grass growing along its rocky shore. Beyond in the distance the smooth sweeping lines of the surrounding mountains offer evidence of the grinding power of the glaciers that once rode above all but the highest ridges.* (Opposite) *A pair of anglers contemplate the surface of Vogelsang Lake from the trail near Vogelsang Pass. The exotic golden trout, which can survive only at extremely high altitudes, live in this lake set among mountains at 10,300 feet, but only the most skilful sportsmen take fish from its waters*



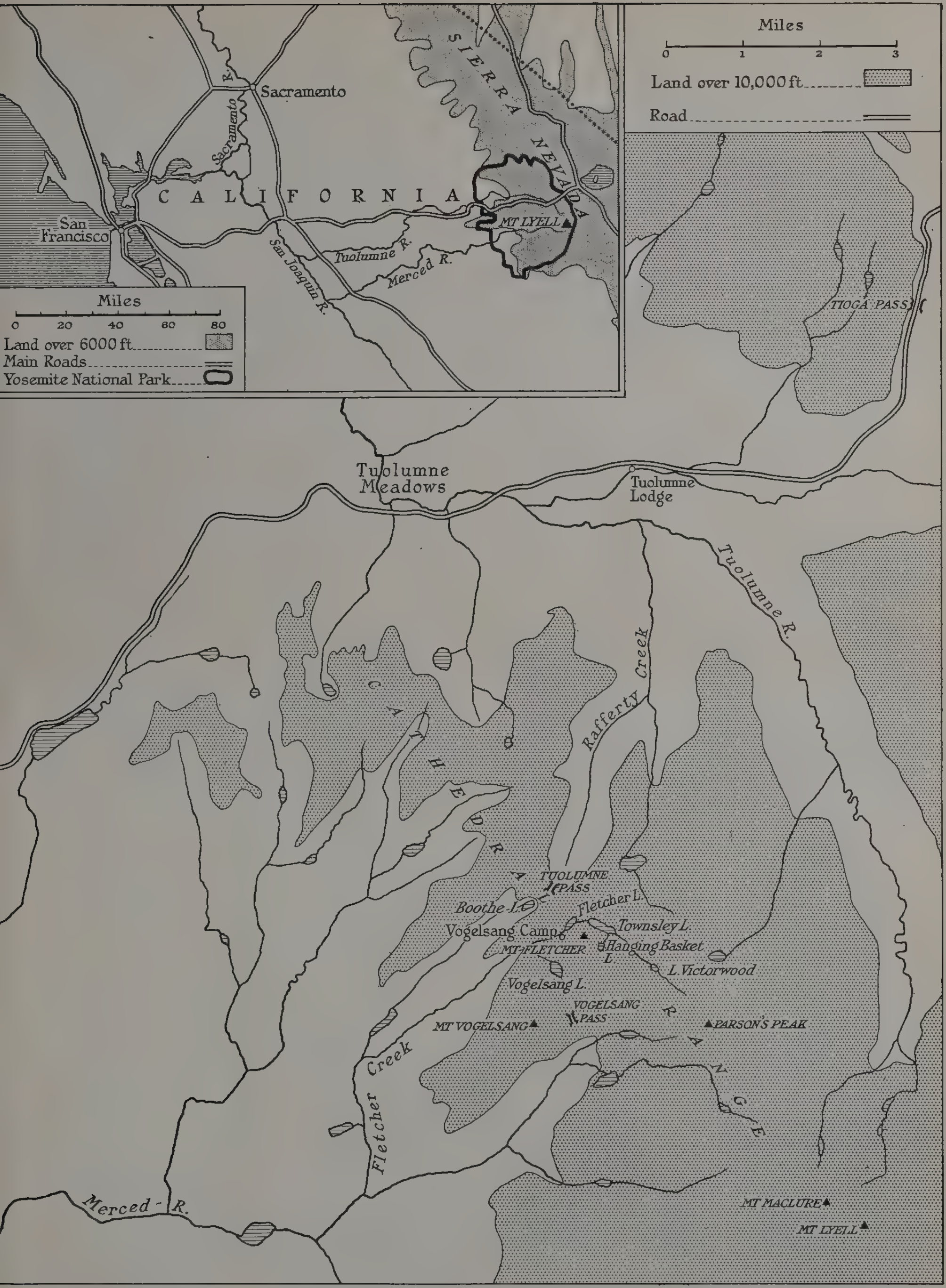
Seen beyond pines near Vogelsang Camp, the smoothly sculptured slopes of Mount Vogelsang, 11,151 feet, culminate in a ragged summit-ridge high above the polishing effects of the glaciers. This is part of the rim of the vast cirque that contains Vogelsang Lake and its slowly enlarging meadow

over a series of waterfalls and was lost in a gigantic apron of gleaming talus that choked the winding canyon. On the southern wall was a hollowed cirque hanging 300 feet above Lake Townsley. A cascade of water poured out of the little valley, marking Hanging Basket Lake. A half-hour's climb up a steep talus slope brought us into a small deep basin containing the lake. The little cirque is tightly wedged into a flaw of the ridge like a cavity in a tooth. Evidently a residual glacier was left on the shady northern slope when the main body of ice melted. The glacier then ground its way into a crevice between two peaks, excavating the little cirque before melting in the warmth of the post-glacial climate. The valley was left hanging far above the canyon floor since its tiny glacier had only a fraction of the excavating power of the main canyon glacier.

Smoothly sculptured granite walls plunged straight down into the water, making fishing difficult. After half an hour of futile fly-casting my companion tied on a small spinner, casting far out and letting it sink. Almost immediately he was rewarded with a solid tug. A moment later a large rainbow broke the surface. We took five fine trout.

After plotting a course back into the canyon, we followed the contour under a shadowy, water-streaked wall and climbed into a perfectly symmetrical talus bowl containing Lake Victorwood. Not an ounce of soil or a blade of grass is to be found at this sterile little tarn—and apparently no trout. Both inlet and outlet streams are deeply buried, gurgling far below in the debris. Lake Victorwood, a glacially scooped hollow filled with talus and snow-water, is very much younger than Lake Townsley in the pattern of evolution.

We stopped on a smooth boulder for a lunch of crackers, cheese, dehydrated dates, and a long draught of achingly cold water. Climbing up a slope of piano-sized boulders we reached a tiny cirque at the very head of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Land over 6000 ft
Main Roads
Yosemite National Park
TIOGA PASS
Tuolumne Meadows
Tuolumne Lodge
Tuolumne R.
Rafferty Creek
CATHEDRAL RANGE
TUOLUMNE PASS
Boothe L.
Fletcher L.
Vogelsang Camp
Townsley L.
MT FLETCHER
Hanging Basket L.
L. Victorwood
Vogelsang L.
VOGELSANG PASS
MT VOGELSANG
PARSON'S PEAK
Fletcher Creek
Merced R.
MT MACLURE
MT LYELL

J. Thornton

the canyon. Here, fed by permanent snowfields and lying 1000 feet directly beneath the windy, 12,120-foot summit of Parson's Peak, is a tiny tarn nestled against rocky, snowbanked walls. Echoing sounds of falling rock and tumbling water filled the little basin. The high country seemed to evolve before our eyes. While we watched, eroded and frost-wedged sheets of granite peeled off the canyon walls and fell to swell the fringe of talus and scree. Clear streams from the shaded snow-banks trickled into the little tarn and started the long journey to the sea. In climbing two miles through the chain of five lakes we had gained less than one thousand feet of elevation—and yet we had traversed many centuries of high country lake evolution. After taking a last look at the frigid little tarn we turned and started back down the chain of lakes.

Two hours later we trudged past Fletcher Lake as the afternoon sun turned rugged Mount Fletcher to the colour of glowing gold. We picked a camp-site near the outlet of the lake and prepared a dinner from half the golden and rainbow trout we had caught. The remainder we saved for breakfast.

An hour or two before dawn, when it was still quite dark, we were awakened by grunting sounds followed by the shuffling of padded feet. I poked my nose far enough out of the frosty bag to see a brown bear finishing the last of the trout we had planned to have for breakfast. Apparently satisfied with his meal of delicately flavoured golden trout the bear lumbered away into the dim light—probably heading for another camp.

We were next awakened by a bell echoing through the cold, early-morning stillness, warning that breakfast at the camp was only half an hour away. Since the bulk of our meal had been stolen we packed our belongings and reported to the camp for breakfast. We joined a dozen of the camp's visitors in the canvas dining-room warmed by a glowing pot-belly stove.

A heavy dew was still on the ground when we started the climb toward Vogelsang Pass. The trail wanders beside the flower-studded banks of Fletcher Creek, through lush lodgepole-shaded meadowland onto a vast unbroken sheet of granite. We made our way up a hundred feet of switchbacks and entered the giant cirque lying between Mounts Fletcher and Vogelsang. In the centre of this vast amphitheatre at 10,300 feet, Vogelsang Lake glimmered invitingly. The lake is fed by a number of snow-melt streams flowing through a delta at the opposite end.

After casting near the outlet for half an hour without success, we followed the trail circling the perimeter of the valley, gradually climbing toward the entrance to Vogelsang Pass. From a vantage-point above the lake we could easily see the extent of sedimentation, both on the lake shore and in the depth of the water. Inlet streams have pushed the delta ever farther into the lake until it now occupies less than half of its original basin. Sand-bars and shallow waters extend from the inlet more than half-way down the lake.

From Vogelsang Pass at 10,600 feet we could plot the line inscribed by the surface of the great glacier. The lower walls of Mounts Fletcher and Vogelsang are smoothly cut, but just above 11,000 feet ragged summits of pre-glacial topography emerge. One can easily distinguish between sharp ridges that rode above the ice and polished domes that were sculptured below the glacier's surface.

Climbing through Vogelsang Pass we found ourselves on the cliff-like wall of a vast cirque, at the apex of which stood Mount Lyell. This peak is the highest in Yosemite Park and marks the junction of the Cathedral Range and the main sierra crest. Partly visible on its northern slopes is a group of three glaciers, one of which belongs to neighbouring Mount Maclure. Sierra glaciers are small, averaging less than 300 feet in thickness and ranging from two miles to only a quarter of a mile in length. They are not relics of the Great Ice Age but products of a 'little ice age' which began only a few centuries ago and probably reached its climax around 1850. It may be that the glacier responsible for Hanging Basket Lake was also formed at that time.

From the recesses of the great glacially hollowed canyon at our feet, two small cataracts dotted with tiny lakes threaded their way down from the permanent snow to converge in a little valley with a fringe of forest. A winding stream cut through the lush meadow, flowing placidly past a camp-site we had occupied ten years before.

After descending 600 feet of switchbacks we climbed over a hilly moraine and crossed the valley to our old camp-site. Our ten-mile-climb over two passes had come to an end and we were ready to relax for a week in the headwaters of the Merced River. We lay in the shade rubbing our weary shoulders and looking out over the valley, watching the softly rushing brook until we could wait no longer. Then we put together our fishing-rods and cast upstream for dinner.

Arat, or the Sacred Bath of Trivandrum

by ELLA MAILLART

The author, Genevan by birth, is known mainly through her seven books about Asia where she has always travelled away from the beaten track: her latest book The Land of the Sherpas (*Hodder and Stoughton*) *is a finely illustrated essay on Nepal. She recently returned after some years to South India, drawn especially by the many local observances linking religion with daily life*

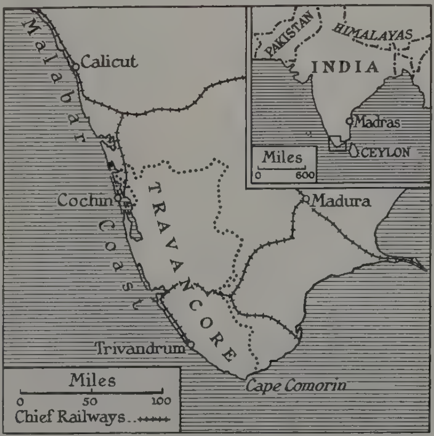
At the opposite end from the long chain of the Himalayas the Indian peninsula terminates in Cape Comorin and the State of Travancore—one of the most fascinating places I know. No invasion has ever troubled this part of the world. Although Alexander the Great, the Moslems and then the European invaders came in turn to upset life in Northern India, in Travancore you still find traces of the Dravidian civilization which existed before the coming of the Aryans. Matriarchal customs are observed today just as they were when the Greek historian Megasthenes described the life of the Queen of Malabar three centuries before Christ. So too snake-worship still exists in the countryside where groves are devoted to the snakes—which are most useful as they destroy hundreds of rodents. They are given milk once a month and each evening a sacred lamp is lighted to them at dusk.

Throughout history Travancore has had a tremendously important world-trade in spices: the Egyptians used them for their mummies, the Jews for incense and the Romans in their medicines. In Roman times the Arabs and Phoenicians held a monopoly of this trade. Later the Portuguese, then the Dutch and British, wrested it from them. But even today I have seen with delight the splendid Arab dhows arriving, all sails set, in the port of Cochin. Ivory from wild elephants and tea, rubber and coffee are the products of this tropical region, enriched by the torrential monsoon rains.

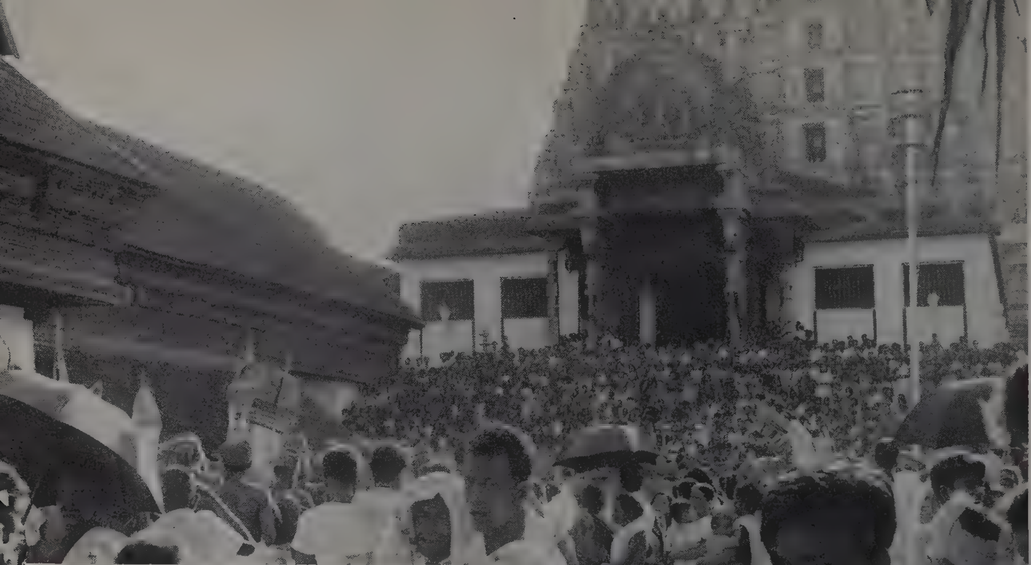
From Malabar, too, come the magnificent Kathakali dances which I described in the April 1954 number of *The Geographical Magazine*; in these, men trained like athletes, dressed as gods and demons, mime and dance the famous epic legends of India: an enthralling spectacle, above all when they are performed in front of a Hindu temple.

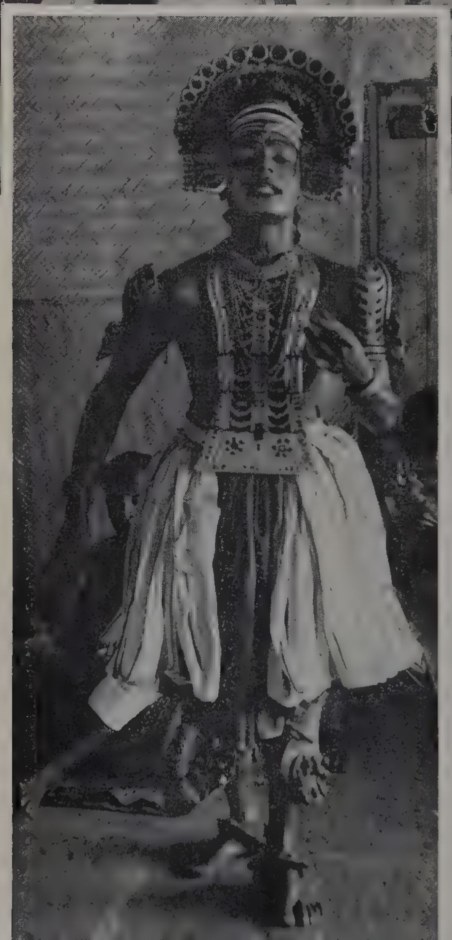
When I was in Travancore in April I was able to see the Arat or Sacred Bath. This occurs on the tenth and last day of the popular festival which takes place each year before the temple of Trivandrum, the capital. On the evening of the ninth day the Maharajah of Travancore goes to the temple garden, armed with a bow and arrow and accompanied by the statue of the god Vishnu. There with a well-aimed arrow he shoots the demon of evil, symbolized by a coconut hidden in a thicket. But the divine statue may not be returned to the temple until it has been purified by a ritual bath in the sea three miles away.

The next day I watched the procession of the Arat, standing on a trestle in the garden of my friend Tambi. There was the Maharajah, his torso bare and a simple cloth folded around his loins. Only the glinting sword held upright in his hand indicated that he is the head of a State of some 11,000,000 inhabitants. He walked barefoot because he is the servant of Vishnu, the supreme spirit whose festival this is.



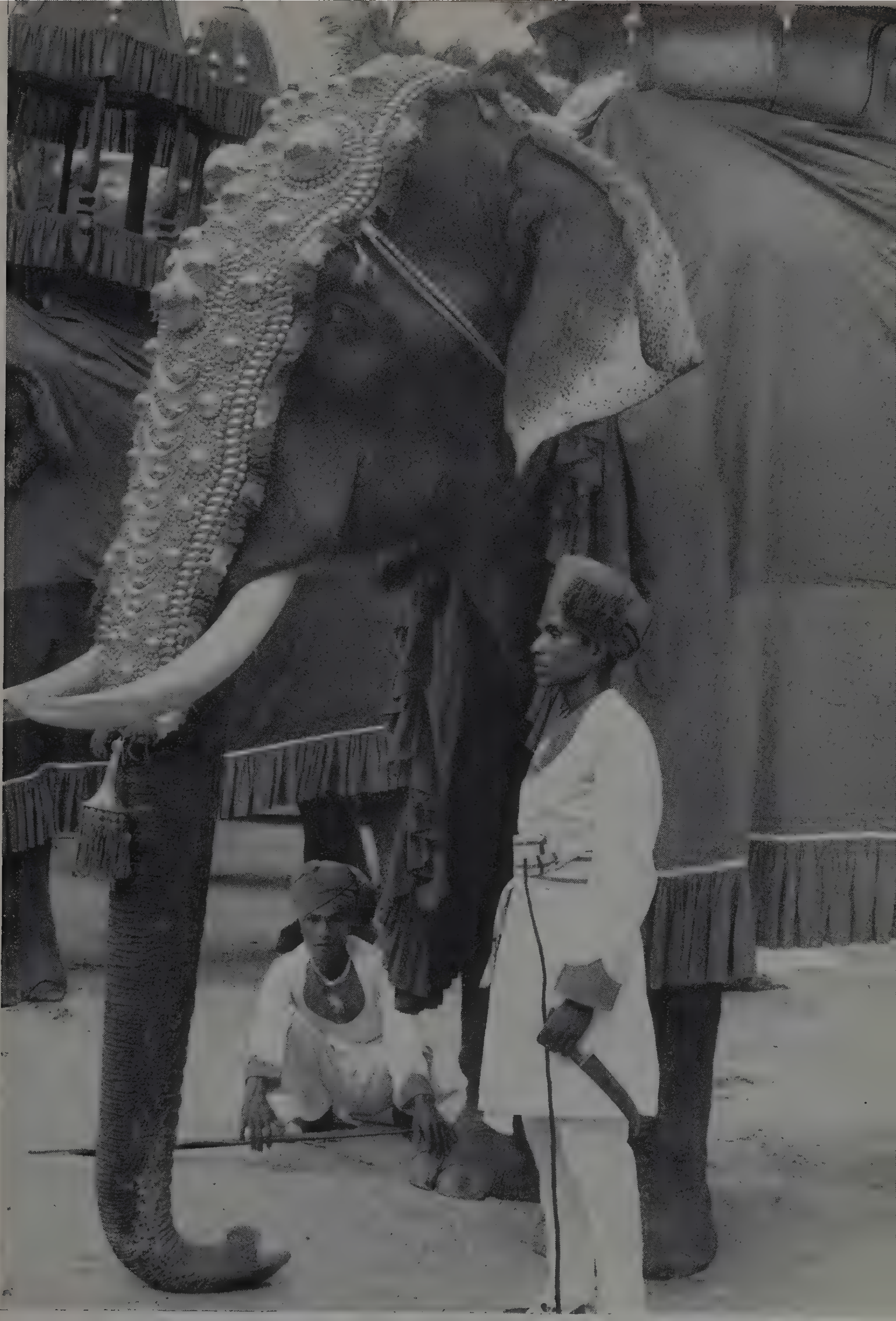
A. J. Thornton

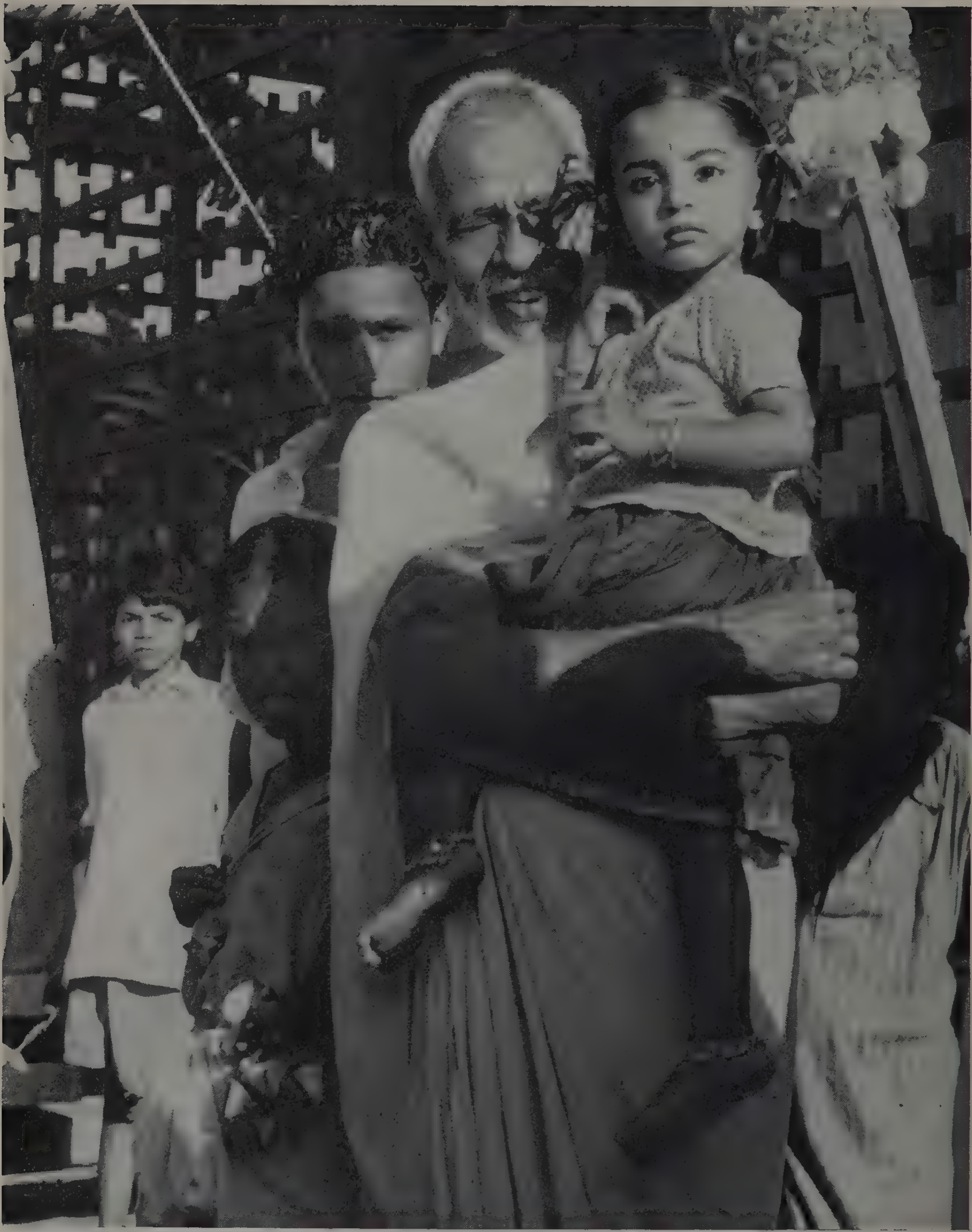




All photographs by the author

The annual festivities which culminate in the Arat or Sacred Bath are an event of great importance in the life of the people of Trivandrum, capital of Travancore. (Above) *A dense crowd of freely mingling men, women and children block the steps leading to the main door of the temple of Trivandrum which is dedicated to an avatar of the god Vishnu, Protector of Humanity. In the background can be seen the four lower storeys of a* gopuram, *the truncated pyramid typical of Dravidian architecture. The long building with carved wood louvers is characteristic of those in Travancore State.* (Left) *An actor performing the* ottantullal *narrative dance. His face is painted green and he shakes the bells on his ankles as, alone in a recess near the main alley leading to the temple, he enacts passages from the* Mahabharata, *the famous Hindu epic poem.* (Opposite) *In India elephants are auspicious animals, symbols of power and riches. They appear—like the elegant limousines of the Western world—at official functions; and though there are no more wealthy princes to keep them, the big temples still maintain a few. The saddle-cloth is red and blue; the embossed frontal is gilded and the howdah, like a small pagoda on his back, is of chased silver, an architectural jewel. No-one rides in the Arat procession: all walk humbly, their feet bare, to honour the deities they accompany*





In a long skirt and loose blouse, like all small girls in South India when they dress up, and with anklets of golden bells, Janaki proudly watches the Arat procession with her grandfather from a vantage-point by the wooden railings of a temple shed in Trivandrum. Faithful to tradition, her grandfather shaves his head only once a month and he wears a long upper cloth over his bare torso

"You see the golden footprints of Vishnu on his velvet cap?" Tambi asked me. "They are the sign of divine supremacy. Two hundred and fifty years ago our Maharajah Martenda Varma, having crushed all his rivals, offered Travancore to the god. Since then his descendants have been 'at the feet of the divine' and have held sway only as Vishnu's agents. At one and the same moment Martenda Varma attained three objects: he prevented the possibility of risings among his vassals; he expiated the crimes of war; and he cleverly united civil and religious power.

"Here comes the Prime Minister," Tambi went on. "He is barefoot too."

I watched the procession fascinated. The crowd, and I too, were charmed by the simplicity of the young Maharajah and the strength of the symbol he embodied.

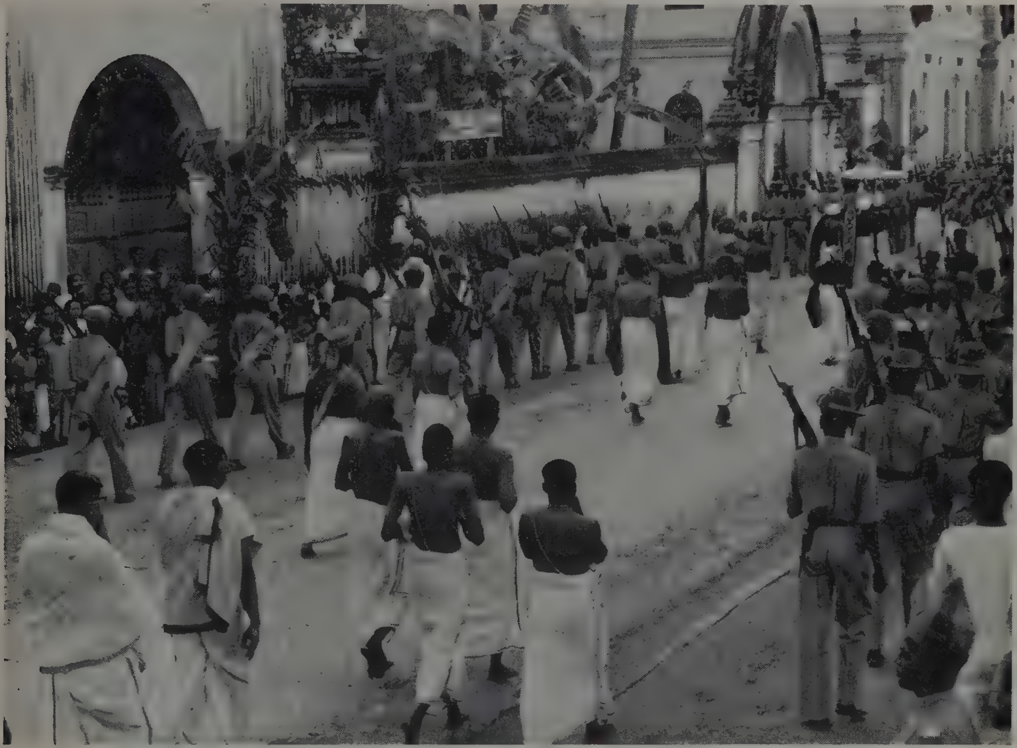
After leaving the temple at Trivandrum the *cortège* set off to cover the three miles to the coast. There, as the sun plunged into the western ocean, at the holy part of the beach called Shanka Mukam—Face of the Conch—the divine statue would be bathed in the purifying sea, in the waters that are the eternal givers of energy. This ritual bath was the final stage of the ten-day festival.

First had come brightly coloured ceremonial parasols; next standards borne by riders on caparisoned horses in honour of Vishnu-Padmanabha. Gold glittered on the embossed frontals of elephants; after them came a group of Nayars in the ancient costume of their warrior-caste, their chests bare, followed by a Gurkha regiment specially brought from Madras.

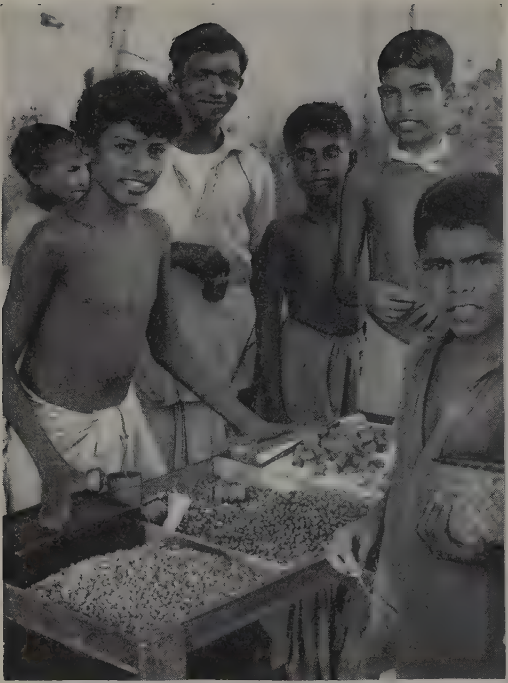
What astonished me most was that, as if compelled by tradition, the first rain of the season began to fall: rain that was essential since the second rice-crop was then being sowed.

At last—preceded by priests in white loincloths carrying in long-handled ladles the clear sacred fire of camphor to draw to itself

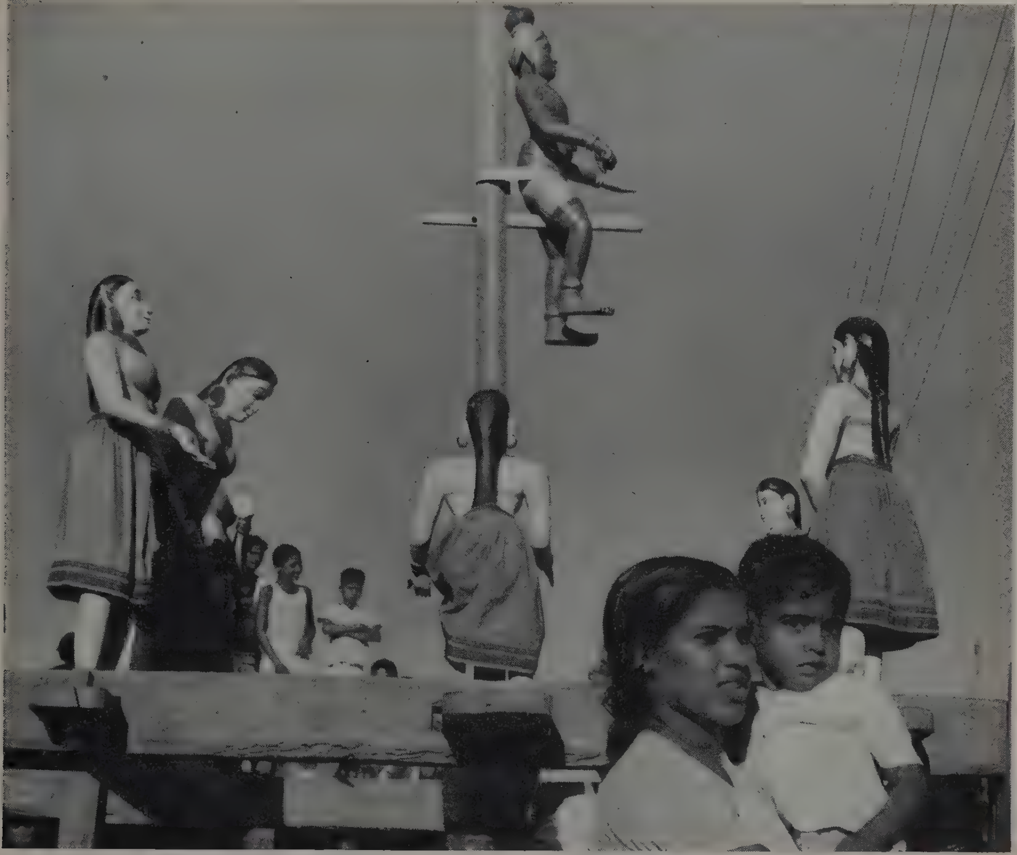
Sword in hand the Maharajah of Travancore (with a dark cap in the centre of the photograph) walks in the Arat procession. Like the dignitaries with him he is barefoot and clad in a white cloth



(Left) *Mythical beasts and heroes line the road to the temple. This queer animal is a Garuda, half man, half eagle, king of the birds, the vehicle of Vishnu when he moves through the skies.* (Below) *Nayars, members of the ancient warrior-caste of Travancore. Towards the end of the Arat festivities they perform the Velakali dance, wearing red turbans and gold necklaces, with shields and batons in their hands. They impersonate the Kauravas in the battle of Kurukshetra, fighting the Pandavas, five brothers whose lives are described in the* Mahabharata. *The war-dance necessitates a long training in the* kalari *or gymnasium which also produces the Kathakali actors.* (Opposite) *The Pandavas are represented by five gigantic statues in red dresses and golden tiaras, rings, arm-bands, long golden nails, with ear-disks and masks that appear terrifying "because good people do not always look good". Their size indicates that they are great heroes, ready to fight the evil ones—the Kauravas—who will not give them back their possessions. They will be victorious, and at dusk the Nayars will disappear among the lengthening shadows around the temple*



(Left) *A Malayali boy of Trivandrum is pleased by the crowds watching the Velakali dance, for he does a busy trade in peanuts and sweets among the boys running from one attraction to another. Fearless and charming, they include many types: some of them are black-skinned with the jutting mouths of the Dravidians, while others are long-faced Brahmins, smooth, elegant and fair-skinned.* (Below) *Many pedlars offer their wares during the ten-day festivities: balloons, paper flowers, artificial birds, and toys to squeak or blow*



This scene depicts the story told of Krishna when as a sixteen-year-old cowherd he played many pranks: he is hiding in a tree, having stolen the clothes of the milkmaids while they were bathing

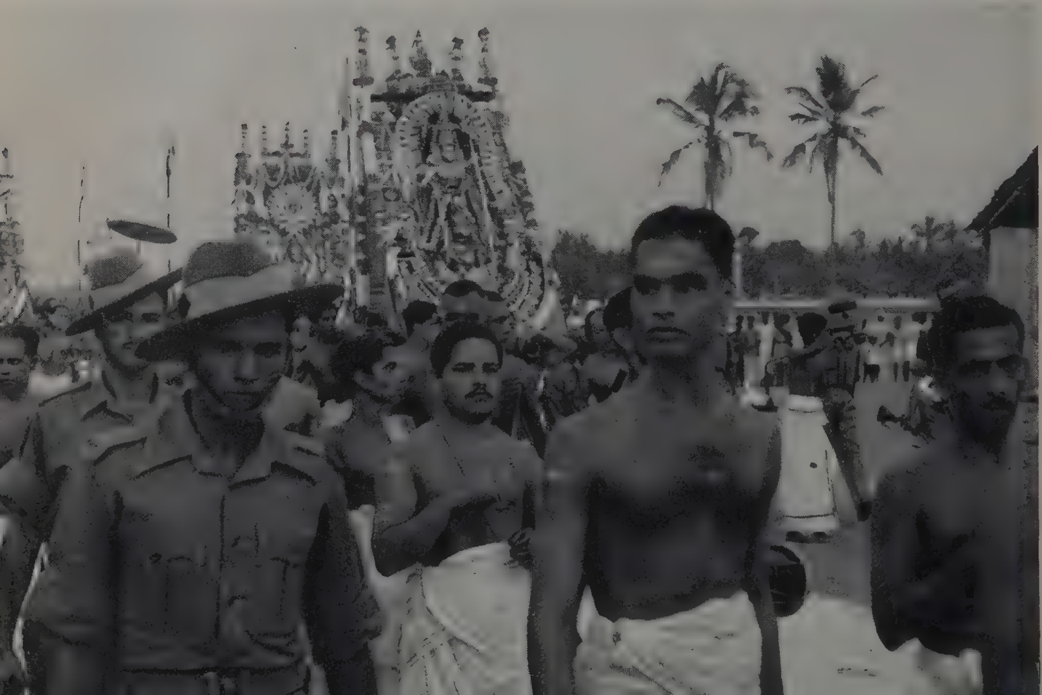
the evil eye—came the heart of the procession: three altars borne on trestles on the shoulders of priests, supporting three of the forms of Vishnu: Padmanabha, Narasimha the man-lion and Krishna the divine youth. So many jewels and garlands adorned them that the statues were almost hidden.

I went by a road twisting among the coconut groves, with their walls of pink earth surmounted by a little roof of thatch, to the white beach by the aerodrome. The taxi-driver never stopped hooting. I am sure that drivers in hot countries love speed because it makes them cool, a state so rare in the tropics.

The crowd was massed along the edge of the beach where long ago fishermen had found a conch. Such a shell is the emblem of Vishnu and a ritual object because it emits a deep sound like the sea, a sound heard even by those outside when it is blown by a priest in the temple. It is a sound complete in itself like the sacred syllable "Aum", symbol of the three worlds and of the point beyond matter from which the creation proceeds.

At the end of the road, on the sand, an ancient wayside altar or *mantapam* with black stone pillars sheltered the three divinities for a while. There various authorities—army, police, priests, whom I tried to move in vain—prevent all-comers from approaching the shore. The beach is immense and I could not see the ceremony itself, simply framed by the sombre sea and the sombre sky. Down there some fishermen mounted guard in their boats around the sacred bath—a hereditary privilege. The religious rite, full of subtle and even magic forces, took place far from

(Above) *Youthful spectators on a wall beneath a breadfruit-tree, waiting for the procession to pass.* (Below) "*The heart of the procession*" *: three statues representing avatars of Vishnu. Accompanied by Gurkhas and carried by Brahmin priests, they have completed the greater part of their journey to the sea*



The divine statues rest for a while under a sacred black stone shelter by the shore. After sunset and their yearly ritual bath in the sea they will be taken back to the temple at Trivandrum

the eyes of the profane.

I watched the spectators join their hands before their foreheads to salute the passing of the flower-decked statues. That of Padmanabha—the Lord with the lotus navel—has great power, they say, because it was consecrated by a saint, Vilva Mangalam, and has ever since then been unceasingly worshipped by its faithful devotees.

They tell how each morning while the saint performed his devotions to Vishnu a child named Krishna came to tease him until one day the saint, exasperated, sent the child away. The latter then said to him: "Never again will I join your devotions. One day you may perhaps find me in the forest of Anantasayan."

The saint then realized that he had chased away the god Krishna whose daily visits had rewarded his austere devotions. Wandering in the forest, he later discovered a stone statue of Vishnu lying on the snake Ananta—the omnipresent spirit asleep on infinite time. A lotus growing out of his navel supported Brahma the creator. Deeply moved, the saint wanted to worship this symbol; for this purpose an untouchable woman gave him fire, rice and a coconut, which, now covered with gold, forms part of the temple treasure, for on this very place was built the celebrated Trivandrum pagoda, the property of the Maharajahs of Travancore.

Even now the feast of Arat may not begin till a female descendant of that untouchable woman comes to bring fire to a priest standing at the door of the temple. The fire is in effect the basis of the divine service. This gesture signifies that even untouchables are part of the great Hindu family.

The many Communists in Travancore undoubtedly very much dislike these "superstitious customs". A student said to me: "Europeans are extraordinary. Why are they so interested in our outmoded ways; why do they give them such exaggerated importance?"

"How right you are," I replied. "But no doubt we suffer from too much science, too much machinery, too much rationalism. Perhaps, having lost track of our own spiritual tradition, we tend all the more to underline the still living traces of yours."

The Formosans

by RICHARD SCOTT

All photographs by Douglas Pike

The general public has read a great deal about Formosa's place in international politics, but very little about the people of the island and their place at home. The Diplomatic Correspondent of the Manchester Guardian, *who visited Formosa last year, here supplies the information we lack*

(Above) *Chiang Kai-shek's palace in Taipeh, capital of Formosa, also houses administrative offices. This is one of many buildings displaying Japanese style that are legacies of Japanese colonial rule*

It is less than a year ago that the eyes of the whole world were turned in anxiety towards the island of Formosa. Ninety miles or so of sea lie between Formosa and the Chinese mainland and this Formosa Strait was then considered to be the most serious danger-spot in the world. The Chinese Communists were threatening almost daily to attack—or, as they called it, to "liberate"—the island. Chiang Kai-shek and his Nationalist Chinese forces replied that they would defend their island to the death; and the United States had committed itself to support them. There was in this Formosa problem all the elements of an international explosion which it seemed most unlikely could be confined to a 'local war'. That was the picture up till about six or seven months ago. Since then a strange quietness has fallen over the Formosa Strait. Both sides seem to have drawn back at the horror of what is now involved in modern warfare. But the tension and the danger could return at any moment. There have indeed been some signs recently that Peking is becoming increasingly restive.

This article, however, is not concerned

with the past or present political aspects of the Formosa situation. It is concerned with the island of Formosa itself and the people who live on it. It was at the height of the Formosa crisis last year that I decided to pay a short visit to the island. What I have to say here is based largely on what I learnt during that visit.

First of all let me place Formosa in its proper geographical and historical setting. The island lies between 90 and 120 miles off the south-east coast of the mainland of China. It is a little under 250 miles long and between 60 and 80 miles wide, with a coastline of over 1000 miles and a total area slightly larger than that of Holland. Most of the central part is mountainous and forest-covered—about two-thirds of the whole island.

It was not until late in the 15th century that Formosa—which the Chinese and Japanese call Taiwan—began to be taken over by settlers from the Chinese mainland. The island gets its European name from the Portuguese who were the first Europeans to visit it, in 1517. They called it "*ilha formosa*": "the beautiful island". And I can assure you that it is a beautiful island—not more beautiful perhaps than some other islands or parts of the world that I've seen, but certainly beautiful. The interior is rich semi-tropical near-jungle country; and most of it is mountainous. But it was the foothills and the little villages with their terraced paddy-fields that I found beautiful. I have never been to the Chinese mainland and before I visited Formosa I always imagined that the classical Chinese prints, which we must all have seen at one time or another, showing rather delicate almost feathery landscapes, were the product of artistic tradition rather than accurate, if impressionistic, pictorial representations of the rural scene. The Formosa countryside made it clear that I had been wrong. It was in fact just like those classical prints: soft, finely drawn and very beautiful.

After both the Spaniards and the Dutch had partially succeeded in occupying the island in the early 17th century, Formosa finally became a part of the Chinese Empire of the Manchus. In 1682 it became a prefecture of the mainland province of Fukien and almost exactly 200 years later it became a separate Chinese province. Only ten years after that, however, in 1895, Formosa passed under Japanese control as a result of China's defeat in the Sino-Japanese war. The island remained under Japanese colonial rule for half a century; and as a consequence most of the main buildings in Taipeh, the capital, are of Japanese rather than Chinese architectural style. After Japan's defeat in World War II Formosa returned to Chinese administration—though the legal position concerning the sovereignty of the island is still undecided.

In 1949 Chiang Kai-shek and his Nation-

That Hollywood, too, now contributes to the Formosan way of life is evident in this street scene in the port of Tainan

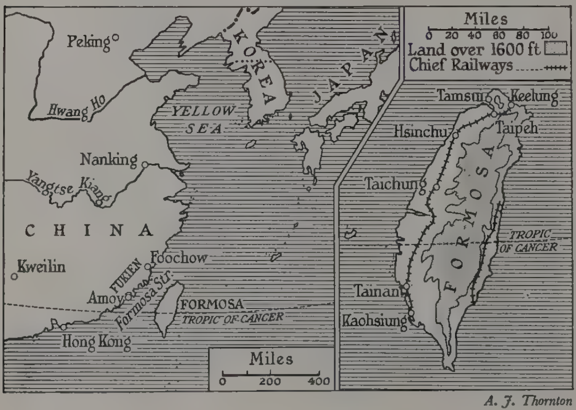
alist forces were finally defeated by the Communists and driven from the mainland to Formosa. The Generalissimo brought with him about a million supporters and over half a million troops. This then is the ethnic picture of present-day Formosa. Of the nine to ten million inhabitants about 98 per cent are Chinese. (All the Japanese left after the war.) The forbears of about four-fifths came to Formosa from 60 to 300 years ago and these are the native Formosan people. The mainlanders, those who came to the island with Chiang Kai-shek in or since 1949, represent about one-fifth of the population. Then there are about 170,000 so-called aboriginals who inhabit the wild interior of the island. These people, whose ancestors until quite recently were head-hunters, are of Malaysian origin and have been on the island for countless centuries. Their language fairly closely resembles that which is talked in Malaya and Indonesia. Their tribal dialects, however, apparently vary to such an extent that Japanese, learnt during the occupation, is the sole common language not only between themselves and the outside world but also between members of the different tribes. Gradually these aboriginals are dying out. They suffer badly from tuberculosis. The men are lazy and lacking in initiative and many of the women, I was told, are coming down from the mountainous interior into the cities.

One of the serious obstacles to good relations between the Mainlanders and the Formosans has been language. There have been even more serious political difficulties which cannot, however, be discussed here. The Mainlanders spoke Mandarin when they arrived on Formosa. But the Formosan dialect is almost as different from Mandarin as French is from English and in 1949 few of the Formosans spoke anything else, except perhaps Japanese. Since 1949, however, the Formosans have begun to learn Mandarin and this is the language taught in the schools. Most of the Mainlanders live in the cities and therefore have little contact with the mass of the Formosan people who are largely peasants. The Chiang Kai-shek troops—some 700,000—are even more isolated from the ordinary people. They are largely kept in barracks and training establishments away from the cities.

Now the existence of this considerable military force in an island with a relatively small population obviously places an abnormal strain on the Formosan economy. Were it not for this factor the Formosan economy would be fully self-supporting. It was always one of the richest of the Chinese provinces and as a result of the industry of the Japanese during their fifty-year occupation it maintained a higher standard of living up till the war than probably any part of China. American economic and military aid has, however, stepped in to assist in the abnormal military effort required of the Formosan economy.

And now let me give a brief picture of how this island lives. Its economy is almost entirely based on agriculture and the processing of agricultural products, of which rice and sugar-cane are by far the most important. Over 60 per cent of all cultivated land is under rice. The climate of the island enables two annual crops—and in certain areas of the south three crops—to be grown. The usual practice is to grow an intermediate crop of wheat or vegetables between the two main (rice) crops. And with so much being taken out of the paddy-fields a large amount of fertilizer has to be used. Night soil—human and animal manure—is still an essential source of fertilizer, though artificial fertilizers are now being used more and more. A small artificial fertilizer industry has been started on the island.

During the past few years an important programme of land reform—the so-called "land to the tiller" programme—has been put into operation. It is designed primarily to give an increased production-incentive to the peasants and to enable



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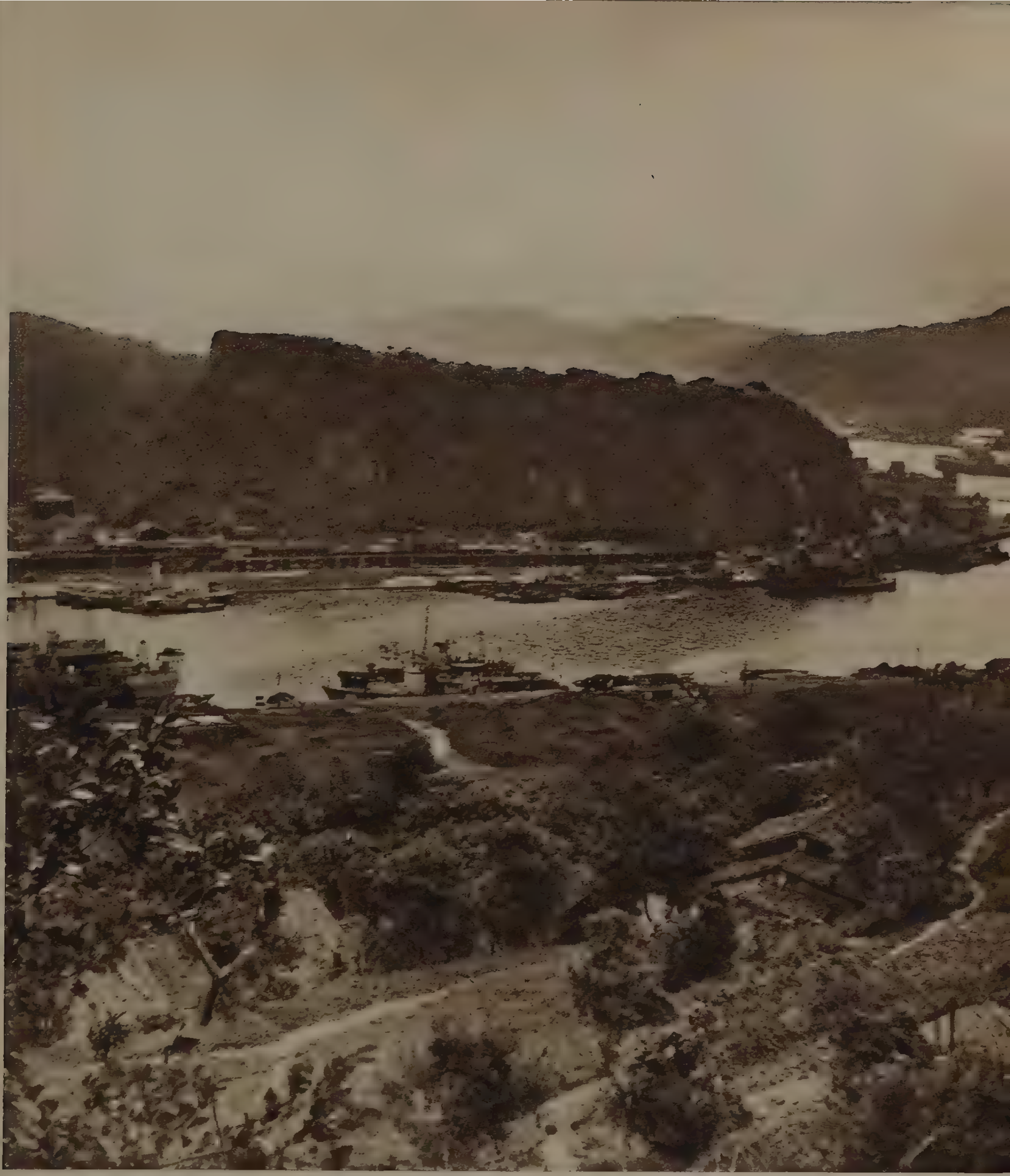
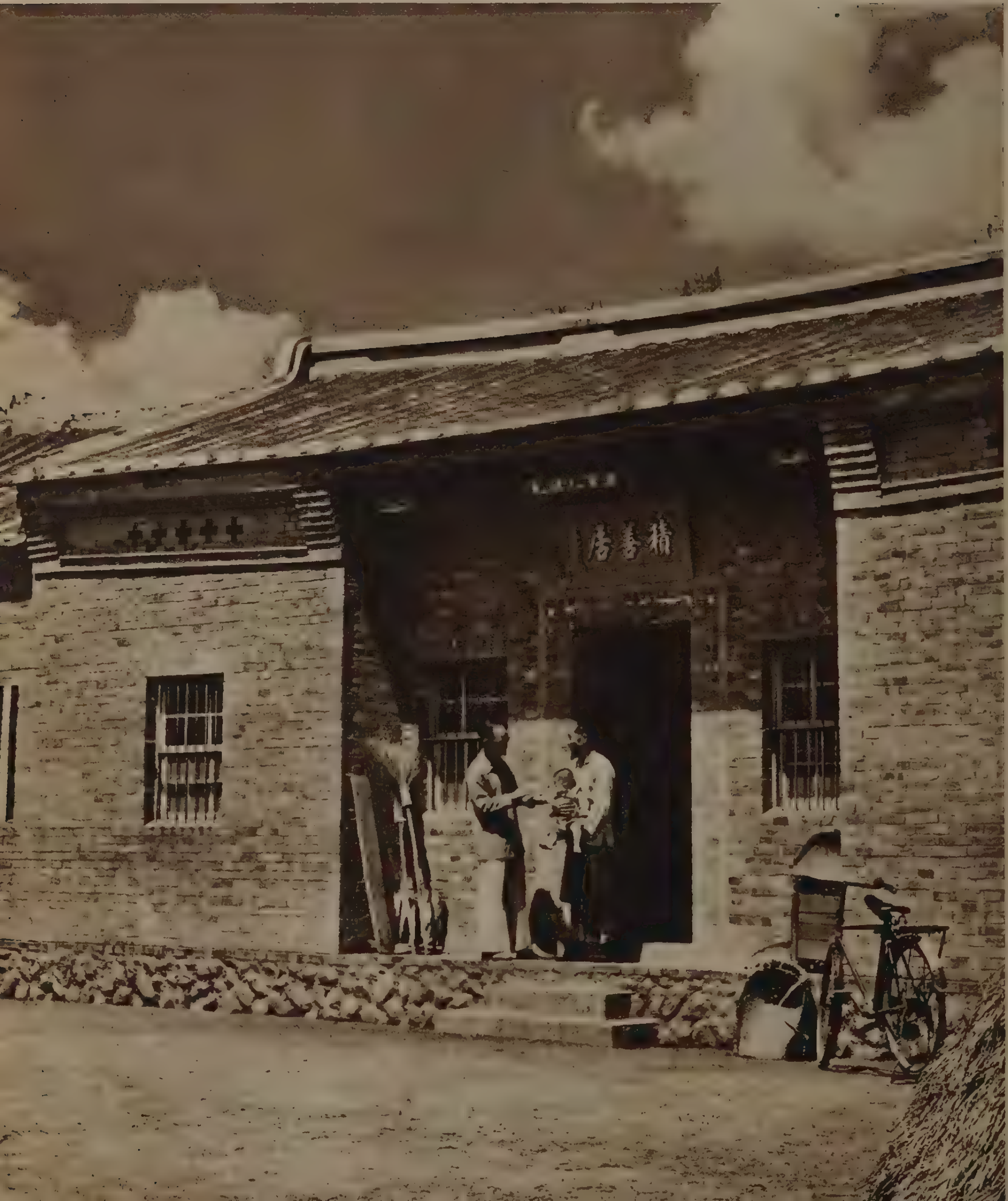
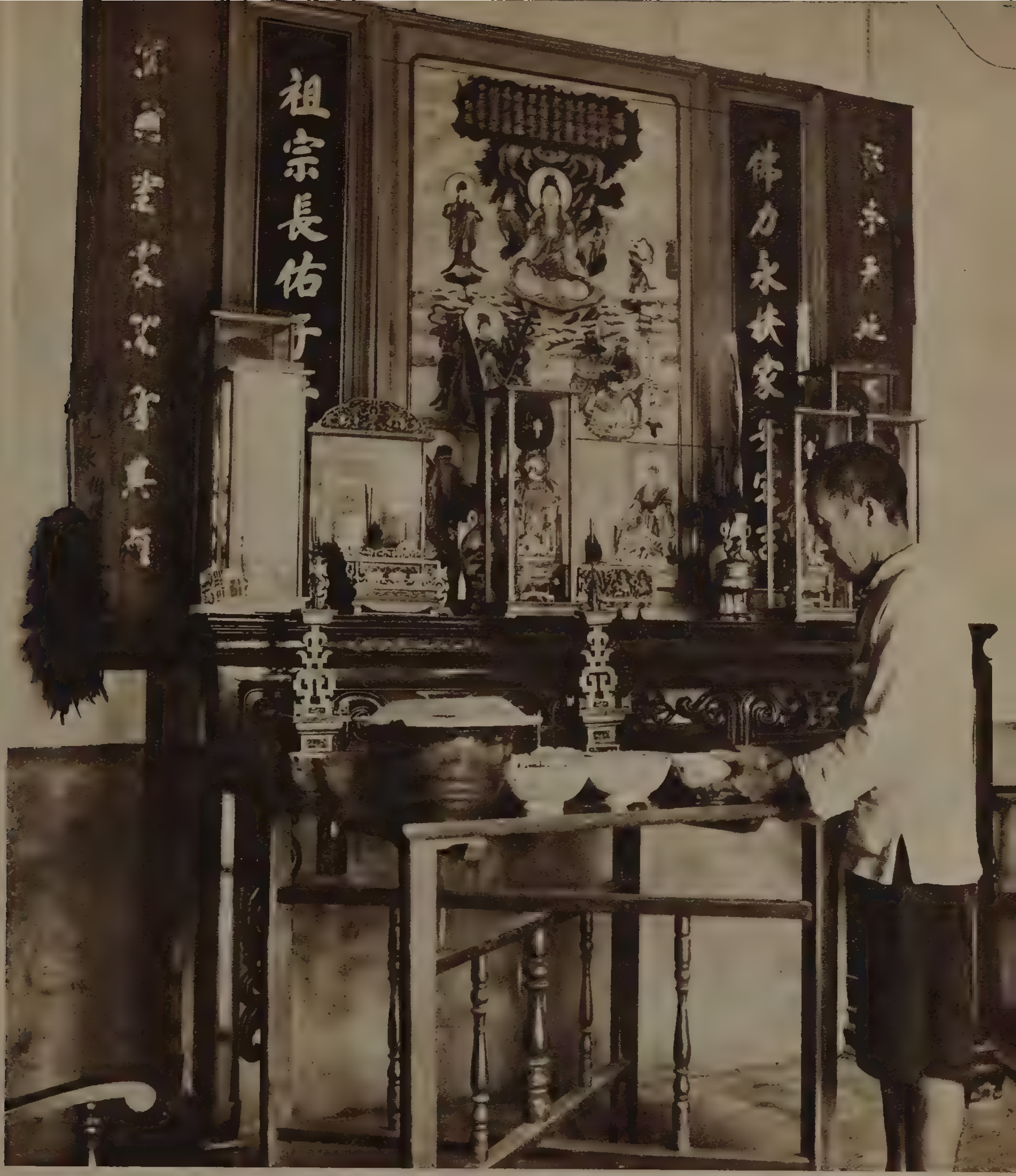


All photographs by Douglas

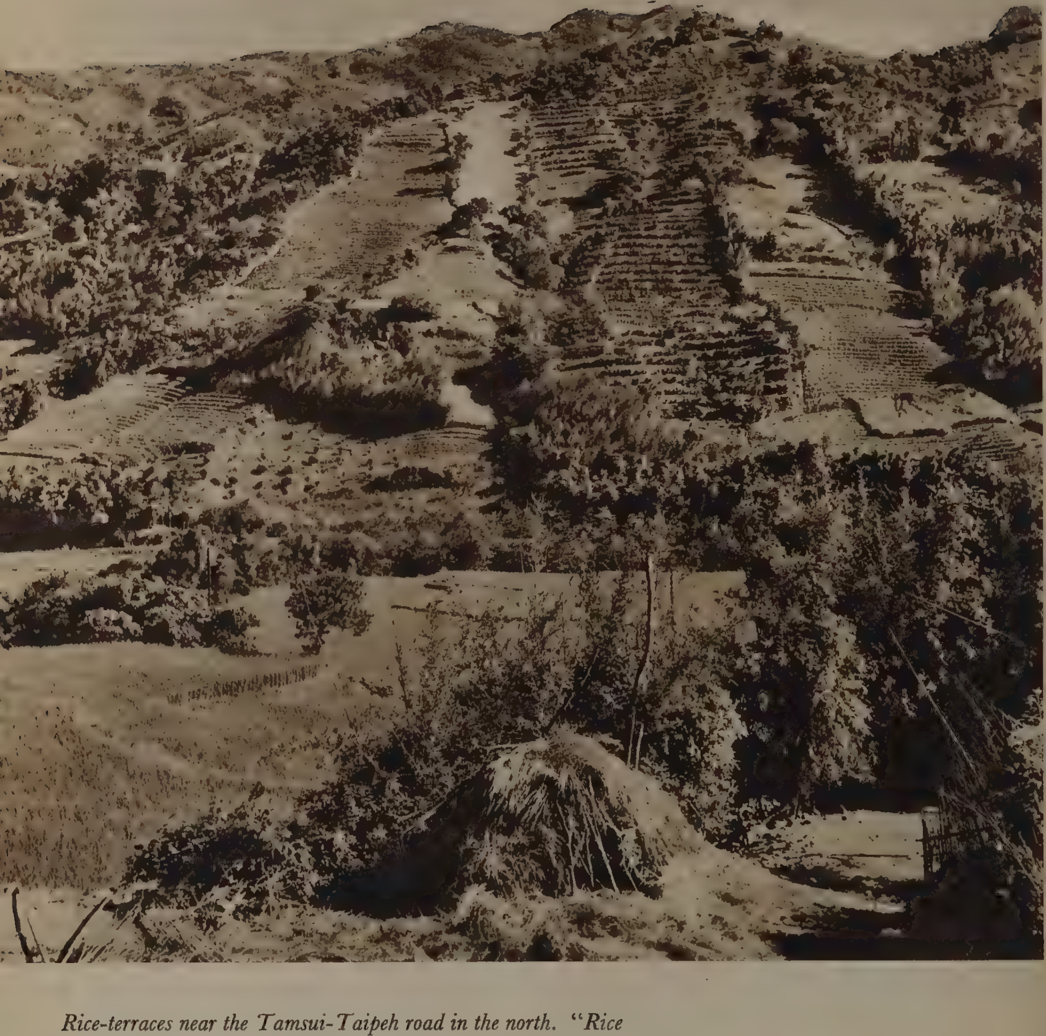
The port of Keelung in the north of the island is one of the few natural harbours on the coast of Formosa (Taiwan). The Portuguese (who gave Formosa the European version of its name) and, in turn, the Spaniards and Dutch, occupied the island. Keelung itself was a Spanish base in the first half of the 17th century, and became a Japanese one in World War II when it was heavily bombed by Allied planes. Today the warships moored in its sheltered waters are those of the Chinese Nationalist forces of Chiang Kai-shek who took refuge from the Communists on the island in 1949

Agriculture is Formosa's principal industry. Since 1949 a land reform programme has been operated with American help and advice. One of its chief aims is to give the peasant-farmers better living conditions. Among the improvements it brings them are well-built houses such as this one between Tamsui and Taipeh, the capital, on the edge of the rich alluvial plain that lies between the mountains and the sea along the western side of the island





The interior of the farmhouse illustrated opposite. The farmer is offering food at the family shrine before it is eaten. Of the island-born Formosan population some 70 per cent are engaged in agriculture. Under the land reform programme an increasing number of these are becoming owners of the farms they till and though the full benefit will not be felt for some years they are already making higher profits, a greater acreage of land is under cultivation and improved farming methods are making it more productive

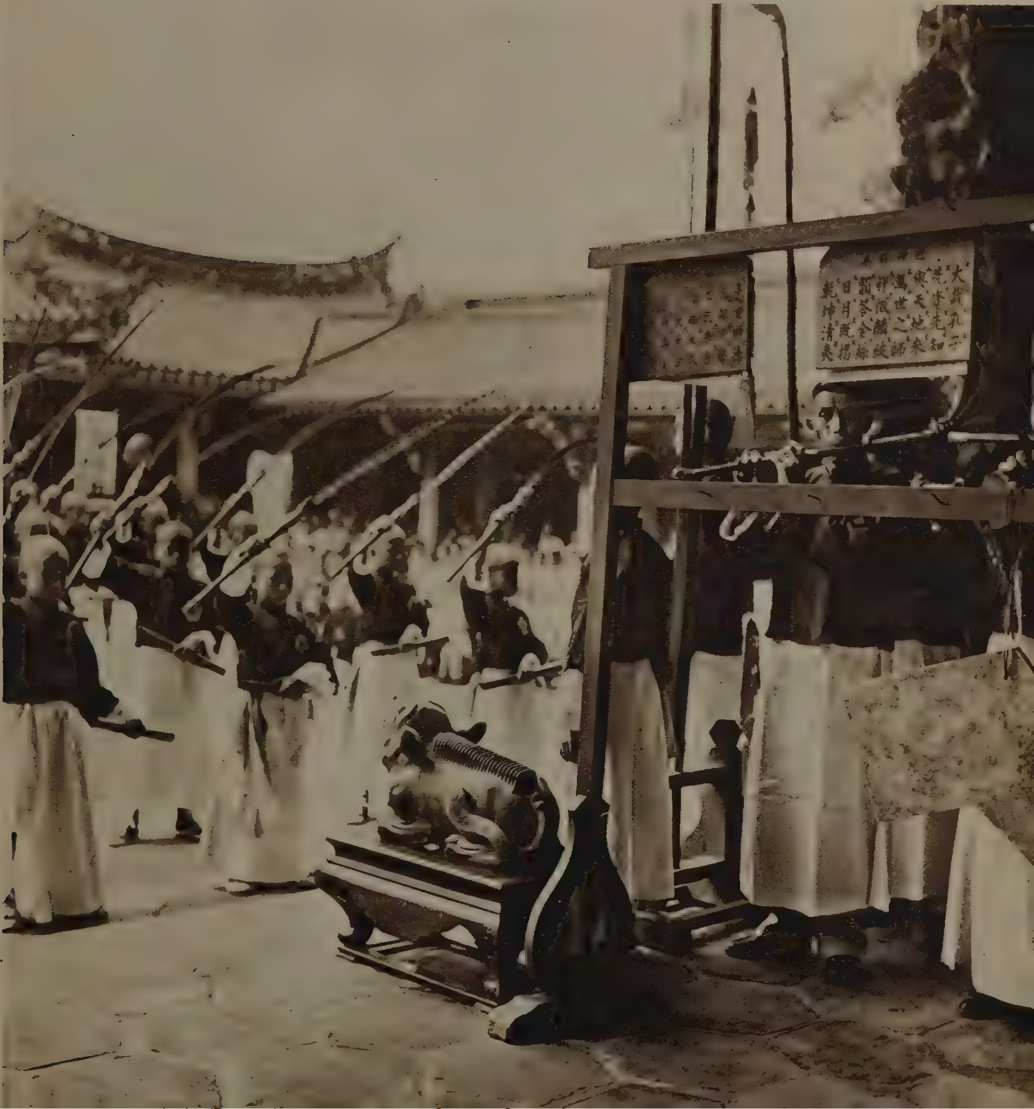


Rice-terraces near the Tamsui-Taipeh road in the north. "Rice is the most important single foodstuff in the world" and rice is the most important crop grown on Formosa, which with Korea contributed before the war a fifth of the rice eaten in Japan. Formosa's tropical climate and good soil yields two and even three rice-crops annually. It is very necessary to replace the nourishment taken out of the soil by such intensive cultivation and the increasing use of artificial fertilizers is now being encouraged to supplement the traditional manure

Holdings in Formosa are small: no peasant-farmer may own more land than can be farmed by himself and his immediate family. But each community is banded into a cooperative in which such things as the breeding of pigs are pooled. Here a tally-clerk is checking rice being taken from a collective godown near Hsinchu on the west coast. Next to rice sugar is the chief export. The main industrial activities on the island at present are those connected with agriculture, for example sugar-processing, rice-milling and the canning of pineapples

Children during playtime in their classroom in a school in Taipeh. The native-born Formosans are Chinese (apart from a small percentage of Malaysian aborigines) mostly descended from those who immigrated to the island during the 200 years before it passed to Japanese rule in 1895. The addition of more than 1,500,000 supporters of Chiang Kai-shek from the mainland to the island's population since World War II has had one significant effect: whereas the Formosan dialect—one of many Chinese dialects that are almost mutually unintelligible—was formerly a barrier between Formosans and the people of the mainland, the official national language of China, known as "Mandarin", is now taught in the schools

Each year, on September 28, the birthday of Confucius is remembered in Formosa as elsewhere among a people who still, after 2507 years, venerate the memory of the sage whose wise teachings have done so much to form the Chinese character. As part of the ceremonies to mark the occasion in Taipeh schoolchildren in brightly coloured shirts and sashes and spotless white 'skirts', waving wands that terminate in long pheasant-feathers, execute a formal dance to the music of a flute-band



In 1911, on October 10, the Chinese Revolution with Dr Sun Yat-sen as its chief source of inspiration overthrew the Manchus. On the tenth day of the tenth month the "Double Ten" celebrations in Taipeh are the occasion for a military parade. Chiang Kai-shek reviews his troops (here rehearsing) and delivers a speech reminding his listeners of the troubled history of the last sixty years of Chinese politics and of the contribution that they may still make to the future of China them to support a higher standard of living and to enjoy greater security of tenure by turning over to them state-owned land and land formerly held by large, often absentee, landlords. American advisers have taken a considerable part in putting this programme into operation. Prior to the land reform programme, which began in 1949, the condition of the majority of Formosan peasant-farmers amounted to virtual economic serfdom. Now the maximum land-holding for each landlord is 3 *chia* (about 7.2 acres) of high-grade land and about twice that amount of unirrigated land. No peasant-farmer can possess more land than he or the members of his immediate family can themselves farm. Formosa is therefore an island of very small farmers. The average small-holding is only about 2½ acres. But, as I have indicated, the land is highly fertile and intensively cultivated. And the peasant-farmers whom I visited around Taipeh seemed to support a very reasonable standard of living. The following budgets were given me by two such farmers and I think they present a fair picture of the sort of way these people live. Since it is virtually meaningless to try and translate Formosan dollars into sterling I have not attempted to do so and a more accurate indication of their value can be had by comparing earnings with outgoings.

The family unit of the first farmer comprised 16 adults and children. The farm was just under 3½ acres. There were on the farm one water-buffalo, the universally-employed draught animal, 19 hogs, 3 sows, 10 piglets, 50 chickens and 15 ducks. This farmer's income in 1954 had been $16,500 from the sale of rice and $25,000 from the sale of hogs (a full-grown hog fetched about $1000). The poultry and the vegetables he grew as an intermediate crop he kept for the consumption of his family. Of his total income between $3000 and $4000 was left over after paying for his rent, irrigation costs, seed, fertilizer, and so on. (He paid $2500 a year in kind to cover his water and land tax and $1000 in cash for his house.) Out of this total saving he would have to make the necessary repairs to his house, pay for clothes for his family, and put aside money for a new buffalo, which costs about $3000 and whose effective working life is about six years. But he and his family were able to afford meat

Some of Chiang Kai-shek's 700,000 Chinese Nationalist soldiers at work in a motor repair shop, watched by the commanding officer of the United States Army Military Assistance Advisory Group

Formosan coal-mines have an unexpected air of rustic charm. Coal (mined near Taipeh and Keelung), petroleum, natural gas, gold, copper, sulphur and salt are among the island's mineral resources

(pork) two or three times a week. He had just had electric light installed in his house.

The second farmer's budget was much the same. He made $15,873 from his rice, $12,000 from his hogs, and $1000 from his ducks. He was chief of the local agricultural unit into which the agricultural community in each district is subdivided. Though his was a voluntary position he seemed nevertheless to be involved in a good deal of entertainment (cakes and fruit and tea) for his neighbouring peasant-farmers. So this farmer, according to himself, was able to save very little. "But", as he said, "man cannot live without friends."

Industry is at an early stage of development in Formosa. Sugar-processing is the chief industry, though there is a growing textile industry and a fairly ambitious electrification programme. There is also coal in the north of the island. The Formosan authorities in fact claim that there are some 200 coal-mines which produce over 2,500,000 tons a year. But of these only two or three are of any considerable size.

A final word about the people. The native Formosan is proud to be Chinese but even more proud to be Formosan. The old semi-religious traditions and festivals are fully observed on the island and on the whole they are encouraged by the Nationalist authorities as fostering the nationalist spirit. But the people of Formosa are most reluctant to play a major role in international affairs. Like most people the world over they would like to be left in peace to cultivate their land and worship at their family shrine. They would like the Mainlanders to leave and to take with them the international problems that their presence on the island imposes on its people.

Chinese Painting and the Chinese Landscape

by PETER C. SWANN

Dr Swann edits the quarterly Oriental Art *and has charge of the Museum of Eastern Art at Oxford*

Almost inevitably the first reaction of a Westerner who sees a Chinese landscape-painting for the first time is: "What extraordinary mountains! Surely they don't really look like that in China?" And yet the odd thing about them is that, however fantastic they may appear on a Chinese painting, however unfamiliar and unreal to us, the vision of the Chinese artist is very well grounded in reality. They may even look impossible—as if they could never stand in such grotesque overhanging shapes; but they do indeed exist, especially in the south of China where many of the finest landscape painters lived and worked. If the Westerner should have any further doubts on the reality of strange mountains in China, he can compare the actual photographs in this article with the landscape paintings which accompany them. He will see that the Chinese artist has not exaggerated them beyond all recognition. Indeed his deep respect for the beauties of Nature would never permit him to make a travesty of a landscape.

The odd shapes of the mountains in China have, of course, their geological reason. Much of China is covered by loess soil, a fine, fertile, yellow dust which in prehistoric times was blown down from the far west of the land. Subsequently, the action of the elements and in particular of the rivers has steadily worn away this soft, frangible deposit of earth, building up huge deltas at the river mouths and even colouring the sea into which the rivers debouch—hence the familiar name "The Yellow Sea". The erosion of the soil has left the harder rock of which the mountains are made often standing in strange shapes which rise sharply from the plains. The Chinese love these strange shapes which give personality and often their names to the mountains and hills. Oddly shaped stones of all shapes and sizes have always held a fascination for the Chinese and Japanese and collections are made of them for use as decorations in houses and gardens.

To understand a Chinese landscape painting it is essential to know a little about the methods of Far Eastern painting in general. Chinese painters, unlike their Western counterparts, very seldom take their stools and easels into the countryside and work directly from Nature. This does not mean that they do not study Nature every bit as closely as the Westerner. On the contrary, the Chinese painter may spend much of his life travelling to see and admire the beauty-spots of his native land. He would consider such a life as the ideal existence. The writings of Chinese painters are full of accounts of visits to mountains and lakes in the company of their friends or pupils and often most charming poems accompany the pictorial record of such journeys. The painter may then spend hours, days or even weeks looking at the scenery and thinking about it, observing how the sun changes its surface or the mists vary its mood. All this is familiar enough to us in the West but, instead of painting his masterpiece then and there, the Chinese artist will return to his studio which is often nothing more than a little hut in his garden bare of everything but his paper and silk, brush and ink. There he will spend perhaps much more time in a calm inward contemplation of the landscape he is about to paint, trying to fathom the very essence of that particular scene, the divine life which animates it. The actual execution of the painting may take very little time—perhaps only a few minutes, perhaps an hour or so, but this would be considered a very long time. He has the whole composition ready-formed in his mind's eye. There is no opportunity for erasures or touch-up as in Western oil-painting for the ink soaks immediately into the absorbent paper and changes are impossible. A mistake can only mean that he scraps the whole thing and starts again, but a spoiled 'canvas' is rare. Such a technique requires tremendous con-

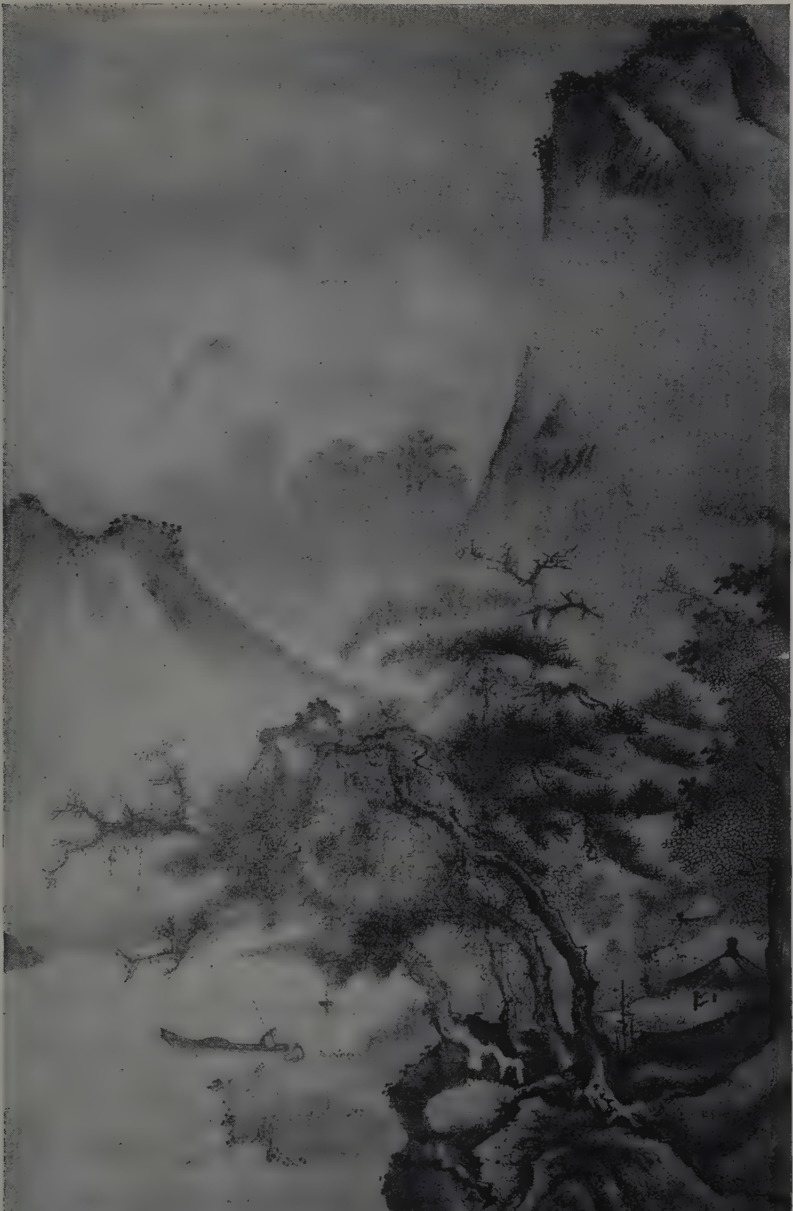
China Photo Service, from Camera Press

"*A Scene near Kweilin, Kwangsi Province*"

centration, a completely digested knowledge of what he will express and an unfailing skill with the brush.

To the Chinese, landscape painting, the greatest of all forms of painting, means principally the painting of mountains and streams. Indeed the Chinese word for landscape, *sansui,* is made up of the two words *san* meaning "mountains or hills" and *sui* meaning "water or rivers". Of the two, mountains are the most important. They are imbued with their own life and are very greatly revered, some of them even being considered as holy. To be on a mountain is to be nearer to heaven; temples are often built on them; it was there that the ancient alchemists went to conduct their experiments in the search for an elixir of immortality; there grow the purest and most beautiful flowers; and they are the goal of the recluse and the man of the world who desires nothing more than to escape from the bustle and 'dust' of everyday life. The rivers are the arteries of China, closer to the everyday life of the Chinese, not perhaps so mysterious as the mountains but just as vital. Long scrolls have often been painted depicting, for example, "The Thousand Miles of the Yangtze River" taking the viewer through the highlands and lowlands of his country.

The greatest period of landscape painting in China is generally acknowledged to be the Sung dynasty (A.D. 960-1279). By this time landscape painting was already an established art-form and the Westerner will realize from this that pure landscape as an art-form emerged in the East some hundreds of years before it did in Europe. In painting sansui the Chinese artist was dedicated to the achievement of what he called the spirit of the scene and not merely its external appearance. This was one of the essentials of Chinese painting laid down as early as the 6th century by Hsieh Ho, the father of all theories of painting in China. A realistic painting, the accurate copying of Nature, would be meaningless to him. A writer of the early 11th century, talking of landscape painting, says: "Wonderfully lofty and divinely beautiful are these mountains. In order to exhaust their marvels and grasp the work of the Creator, one must love their spirit, study their essential features,



By courtesy of the William Rockhill Nelson Gallery of Art

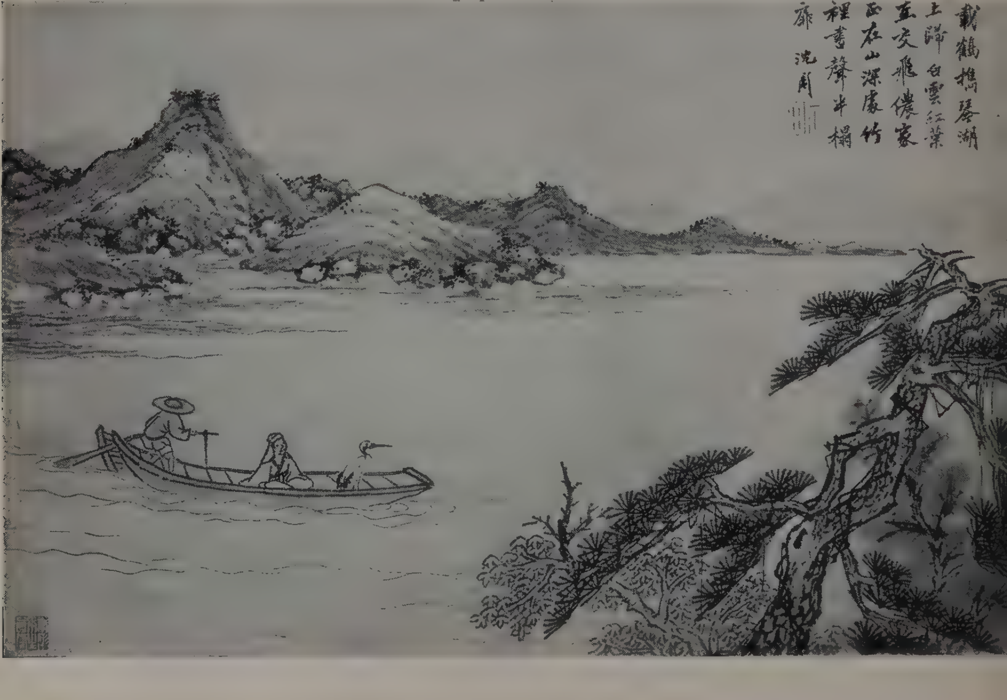
Autumn Landscape, *attributed to Hsia Kuei* (*c. 1180-1230*)

China Photo Service, from Camera Press

"*The Waving Hills near Yangshao, Kwangsi Province*"

Man, Bird and Boy in a Boat, *attributed to Shên Chou (1427-1509)*

By courtesy of the William Rockhill Nelson Gallery of Art

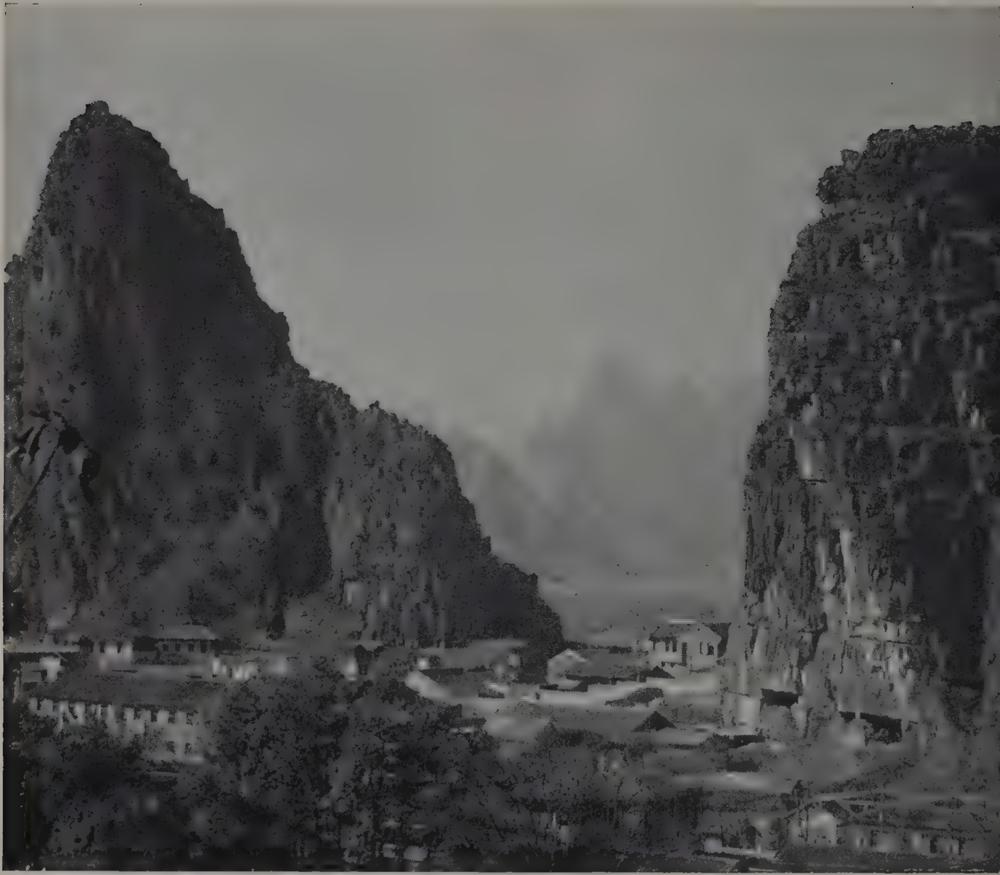

載鶴攜琴湖
上歸白雲紅葉
互交飛儂家
正在山深處竹
裡書聲半掩
扉 沈周

China Photo Service, from Camera Press

"*Fishing Boats on the Li River near Kweilin*"

On the River, *a section of a scroll by Tai Chin (15th century)*

By courtesy of the Smithsonian Institution, Freer Gallery of Art



China Photo Service, from Camera Press

"A View of the Wind-Cave Hill, Kweilin"

wander about them widely, saturate and store up the impressions in the heart."

These few introductory remarks on the subject of Chinese landscape painting are only intended to prepare the reader for the differences which will be seen between the photographs and the actual paintings. The similarities should be obvious enough. The most striking thing about a Chinese landscape painting is its high vantage-point which gives a bird's-eye view of a scene. By happy chance most of the photographs here reproduced seem to have the same high viewpoint. This gives a valuable clue to why the Chinese painter chose this particular convention. The sensitive camera-man, in order to obtain the best view of the landscape, was, like generations of Chinese painters before him, unconsciously driven to a high point in four out of the five views he photographed.

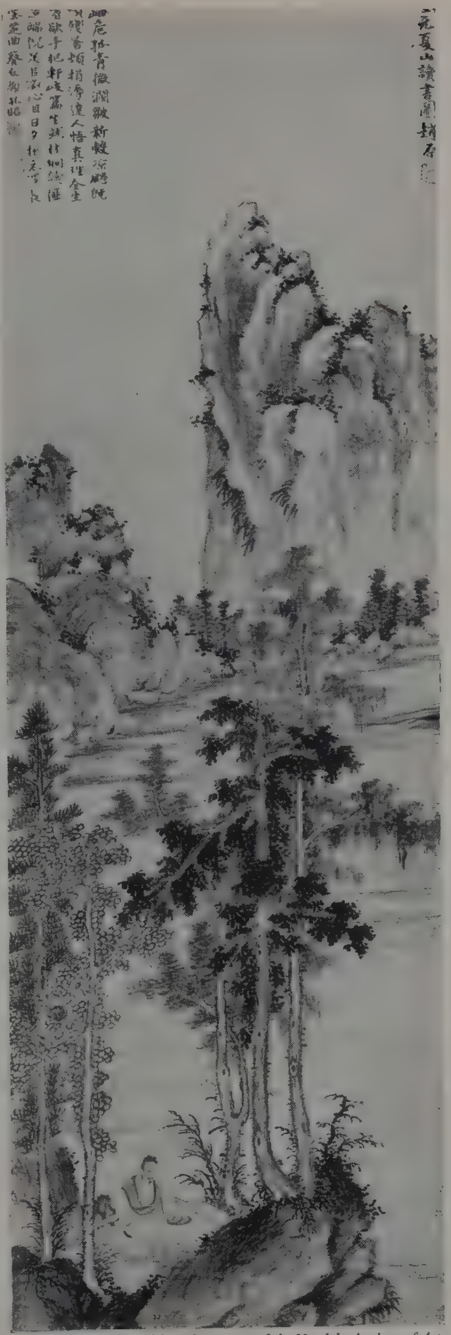
With the photograph of the "Scene near Kweilin" compare the *Autumn Landscape* attributed to Hsia Kuei, one of the great Sung landscapists. Here is no photographic perspective. In essence there are only two planes but the spectator is cunningly led from one to the other by such artifices as a boat or a bank of mist. The photographer will include a part of a tree in the corner to vary the flatness of the scene—the painter will feature it as perhaps the most important part of the composition. Compare the photograph of "The Waving Hills near Yangshao" with the *Man, Bird and Boy in a Boat* attributed to

Shên Chou (1427-1509). The painter has reduced the scene to its barest essentials. The time of day is different, it is morning in the photograph and perhaps mid-day in the painting. The artist has been selective and scientific perspective means nothing to him. He has expressed what he calls "the far and the near" and that is enough. He has his technique for depicting mountains and pine-trees and after that his aim is fundamentally to express a mood.

The photograph of "Fishing Boats on the Li River near Kweilin" is photography at its best. The painter would see it differently as shown in the section of a handscroll *On the River* by Tai Chin (15th century). He would be at a greater distance and less intimately connected to the water.

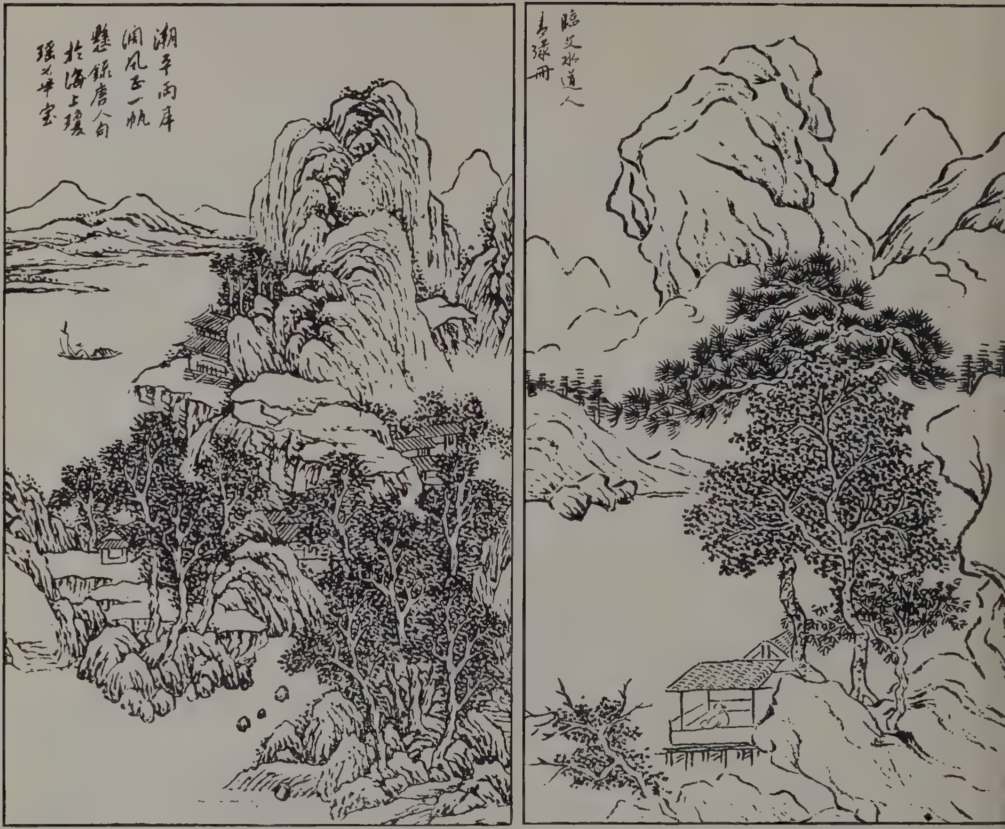
The "View of the Wind-Cave Hill in Kweilin" is perhaps of all the photographs the nearest to an actual painting—a few trees in the foreground and two huge rocky hills in the background, the two connected by a winding middle ground filled with houses. But in the landscape painting by Chao Yüan (14th century) in which he says he is inspired by an earlier painter, the artist, as all artists should, has selected and interpreted. The trees and the hills are what really interest him and these are explored, featured and exaggerated. They are cunningly used as foils for each other. The middle distance which might confuse the two has been left as an effective blank space which leads the eye from one to the other. Unlike the photograph the artist has placed the recluse, as if he himself was intended, surveying the landscape calmly and peacefully, identifying himself with Nature, a part of it but only a very small, insignificant part at that.

Finally, let us look at a later development of landscape painting in China: the reproductions from *The Mustard Seed Garden Compendium.* This was a book of patterns for painters compiled in the 17th century to guide the artist in anything he might wish to paint. Wang Kai who assembled this interesting book was a gifted amateur but is not known as a particularly good painter. The name of the collection comes from a garden in Nanking owned by a wealthy man who used to welcome there the painters of the period. Wang Kai was first given a set of forty-three drawings by a previous painter and these he expanded into a book of 130 leaves to which



Landscape Painting by Chao Yüan (14th century)

Photograph by Raymond Sato, by courtesy of the Honolulu Academy of Arts


潮平兩岸
闊風正一帆
懸錄唐人句
於海上瓊
臨文水道人
青綠冊

From the author

Illustrations from The Mustard Seed Garden Compendium, *a 17th-century pattern-book for painters*

he added a text. The first edition was printed in 1679. The first of the five parts of the book is devoted to trees, branches and leaves. Then come stones, cliffs, mountains followed by figures, animals, birds, buildings, bridges, boats and furniture. The fifth and last part contains landscapes in the manner of old masters into which the previous elements are fitted.

These model books had a tremendous success in China and were frequently expanded and reprinted. Narcissi, bamboos, plum blossoms and chrysanthemums were added to the original series. A third collection was prepared to include flowering plants, insects and flowering trees. In 1818 yet another addendum was prepared and this was devoted to portrait and figure paintings. Thus the whole range of Chinese painting came to be included in the encyclopaedia. Anybody who was able to use a brush—and that means almost everybody who could write—could also, with a little application, learn to paint from these books. It took a very strong character to escape from their influence.

To formulate one's paintings in such a way was, of course, in the long run a highly destructive development for it tended to dry up the springs of inspiration which had for so long fed generations of Chinese artists. However, they have their interest in our efforts to see landscapes through the eyes of the Chinese painter. Since travel to China is now so difficult we may long have to content ourselves with what such photographs and paintings can tell us of the beauties of "The Middle Kingdom".

Why an International Geophysical Year?

by GORDON ROBIN

During the next three years many apparently unrelated news items will, in fact, have a common source: the work of the International Geophysical Year. The author, a physicist, was a member of the Queen Maud Land Expedition in 1949-52 and is concerned with the preparation of British activities in Antarctica for the I.G.Y. He will describe later developments in further articles

MAN has always been curious about the world in which he lives, and the support for the coming International Geophysical Year shows that among influential people of many nations this curiosity is probably as strong as it has ever been. In ancient times the great philosophers used to speculate on the nature of the earth, and some among them realized that it was round. The popular belief, however, long remained that it was flat, and up to the Middle Ages sailors were still afraid of falling over the edge in their ships. Gradually people sailed further abroad, found new lands with different climates, and finally Magellan sailed right round the world and convinced the last sceptics that it was, in fact, a globe. During the few centuries since then geographical exploration has covered the face of the earth, and with the exception of much of Antarctica, nowhere completely new remains to be seen for the first time by an intrepid traveller.

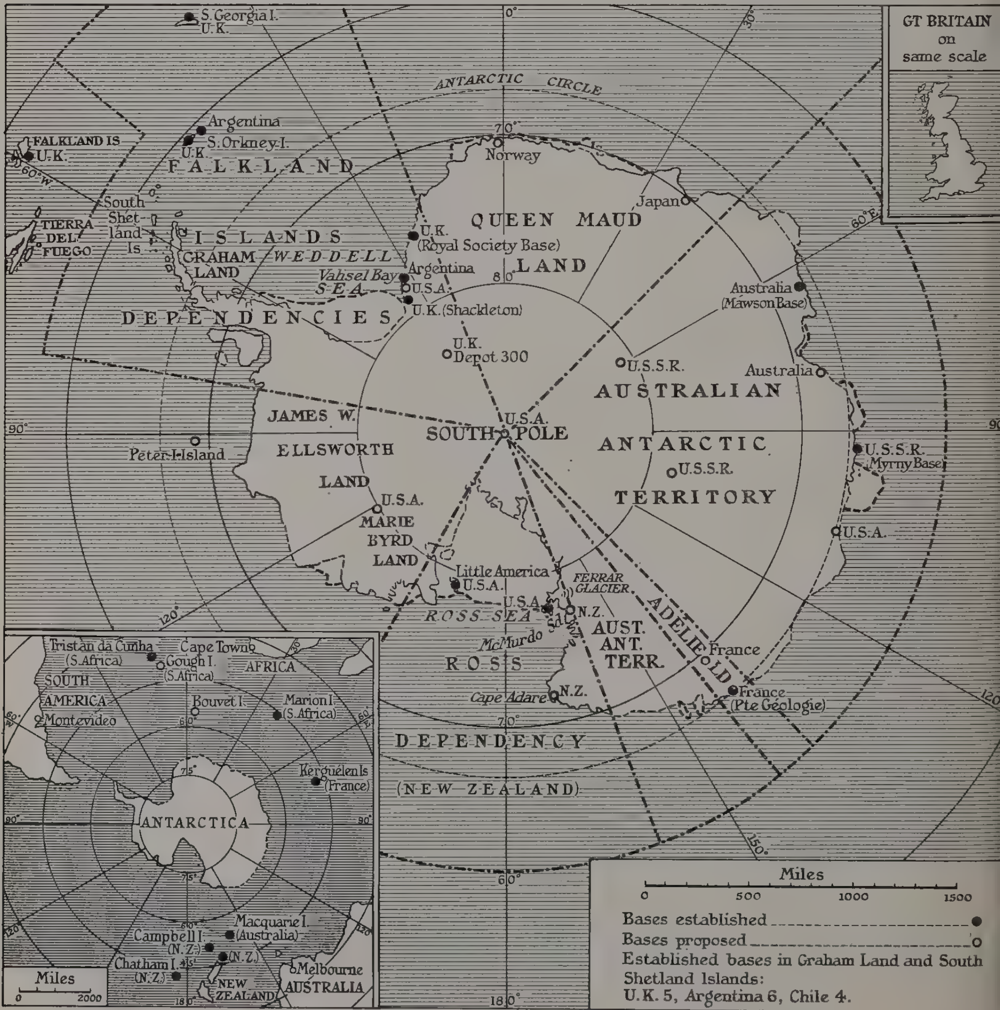
Instead of leaving men frustrated or satisfied with having no more vast territories to explore, the situation seems to have whetted their appetite to learn more about our own planet. Visionaries may look forward to the exploration of the moon as the next logical step, but most scientists find that trying to understand the nature of the earth is a fascinating full-time task.

While the early explorers were, and present-day geographers to some extent still are, primarily interested in the nature of the surface of the earth, this represents only a small, although most important, section of our planet. Aircraft now use the atmosphere up to some seven miles above its surface on regular commercial flights, while some military aircraft can reach a height of twelve miles. Short-wave radio communications around the world depend on the existence of atmospheric layers up to 100 miles above the surface which act as reflectors to the radio waves. In the opposite direction, mines are now worked almost two miles below the surface, while drill-holes have penetrated some three miles. It is not surprising therefore that research workers are turning their attention increasingly to the regions above and below the surface of the earth. Very considerable progress has been made in such studies over the past sixty years by the use of new tools which enable man to study regions he cannot himself easily reach.

This, however, gives only the present-day picture. Let us look at the situation towards the end of the last century in a little more detail. Many notable explorers, such as McLintock, Franklin and Ross from Great Britain, had made expeditions to the Arctic regions to the north of Canada, while Ross had also completed his remarkable Antarctic voyages. In addition to geographical discoveries, much valuable scientific work was done. Ross himself made a special study of the earth's magnetic field, and in addition to being the first to visit the North Magnetic Pole, he located the South Magnetic Pole with comparative accuracy from observations made during the outstanding voyage in which he explored the Ross Sea portion of the Antarctic. The study of the earth's magnetic field was in fact a principal object of his voyage, and it was because of the value of such knowledge for navigation that the Admiralty sponsored his expedition.

As knowledge of Polar regions gradually increased, various problems began to emerge which could no longer be solved by sending single expeditions to certain localities. The direction in which a magnetized needle would point was found to vary a little with time at a fixed locality, as did the force which turned it to this direction. It was important to find out whether these variations were relatively local or widespread. The problems of the weather experienced in Polar regions also needed more systematic investigation, in order to see how weather systems developed in the Arctic regions, and if the weather there governed that in more settled lands further to the south.

The need to coordinate the studies of various expeditions in the Polar regions was first emphasized effectively by Count Weyprecht of Austria in 1875. He, together with Von Payer, had led the Austro-Hungarian Arctic Expedition of 1872-4, and had sailed in the Barents Sea in 1871, so he knew the problems from first-hand experience. The International Meteorological Organization took up his suggestion and sponsored a project known as the First International Polar Year of 1882-3. A uniform programme was drawn up for the meteorological, auroral and magnetic investigations to be carried out at the various stations. Fourteen expeditions finally took the field, twelve around the Arctic regions and two in southern latitudes. Great Britain and Canada combined to send a party under Captain Dawson, R.E., to the north of Canada, about one thousand miles north of Edmonton. The whole project was a considerable success. Some twenty volumes of results and many scientific papers appeared



A. J. Thornto

during the following years as a direct result of these expeditions.

The studies of the physical nature of the earth and its atmosphere, such as those carried out during the First International Polar Year, are now grouped under the general heading of geophysical sciences. These differ in some important respects from studies of pure physics, a subject which lends itself largely to laboratory work. The general cycle of investigations in pure physics is firstly experiment, on which tentative theories or hypotheses are built. Further experiments are designed to test the hypotheses which may then be accepted or modified. Theory and experiment progress together in a form of partnership, each guiding the other.

While the same basic processes of thought underlie progress in the geophysical sciences, the sequence of theory and experiment can only occasionally be linked together so closely. For instance, observers of the earth's magnetism in the Polar regions have found that disturbances in this magnetism frequently occur at the same time as auroral displays. It is desirable to know whether the aurora causes the magnetic disturbance or *vice versa*. If this were a laboratory problem one would take the earth, design a method of varying its magnetic field and see if an auroral display occurred. If this failed, one might then try different methods of causing aurorae to see if these disturbed the magnetic field in the same way as the disturbance originally observed. Finally one would find that by shooting charged particles into the earth's atmosphere the effects noted originally could be reproduced, so the conclusion would be reached that such charged particles were the cause of both the aurora and the magnetic disturbances.

It is of course ridiculous to suggest that geophysicists could vary things on such a vast scale. Instead, they must gather together as many detailed useful observations as possible and try to frame hypotheses to explain these phenomena. The explanations must be based on fundamental physical theories, and in some cases further laboratory experiments may be of help. Experiments of electrical discharge in gases in the laboratory, for instance, may help us to understand the corresponding process in Nature by a study of the visible glow from the gases in the two cases. Laboratory studies such as this are however only an aid to the observation and explanation of the physical characteristics of our planet.

After the First International Polar Year the number of institutions and observatories making continuous geophysical observations gradually increased as the importance of scientific studies came to be recognized more fully. In addition to meteorological and magnetic observations, continuous recording of earthquake waves began about the turn of the century. Other geophysical studies, such as the shape of the earth and the variation of gravity over the earth's surface, were investigated in detail. It was not however until 1929 that a proposal for another International Polar Year was made through the International Meteorological Organization. It was proposed to hold the second such year in 1932-33 on the fiftieth jubilee of the earlier Polar Year.

By that time the number of geophysical sciences being studied had increased to an extent which made it desirable to add some of them to the Polar Year programme. Others, such as gravitational studies in the early 1930s, had nothing to gain by simultaneous observations at different points on the earth's surface, so were not included as special studies for the Second International Polar Year. Other subjects such as radio propagation, which appeared to be affected by magnetic storms, were however added to the programme, in cooperation with the International Union of Scientific Radio-Telegraphy. The International Union of Geodesy and Geophysics and the Permanent Council for the Exploration of the Sea also joined the project, and problems of maritime meteorology, tidal studies and other oceanographical investigations were included. Within the field of meteorology, new instruments and the demands of aviation for the study of the upper atmosphere resulted in wider studies. Among the new instruments, continuously recording magnetometers which could be checked periodically replaced the earlier ones used during the First Polar Year, which required hourly visual readings. A study of the sun's radiation was also included in order to examine the connection between sunspots and magnetic storms.

In addition to a number of stations set up in the Polar regions, the particular geophysical studies for the Polar Year were intensified throughout the world, both at the existing observatories and by establishment of new stations in various countries. The financial depression at that time made organization very difficult but thanks largely to the guidance of the late Dr La Cour of Denmark as President of the International Polar Year Commission, the proposals were carried

By courtesy of the Second International Polar Year Committee

During the Second Polar Year in 1932 twenty-seven balloons carrying meteorological instruments were sent up from the British station at Fort Rae in Canada. The Dogrib Indians, seen watching a release, were offered rewards for recovering the instruments, of which two were eventually found

through with support from some forty-four governments together with grants from various scientific endowments. Twenty-three special stations were set up. Great Britain again sent a party to Fort Rae in Canada under the leadership of Dr J. M. Stagg, now a deputy director of the Meteorological Office in London. They carried out a programme of investigations into meteorological, magnetic and auroral phenomena. In addition Dr (now Sir Edward) Appleton made a very useful series of radio soundings of the ionosphere with a small party he took to Tromsö in northern Norway.

The whole programme was again a great success and has given rise to many useful publications in various fields. The publication of the results of various discussions was hindered by World War II, and the formal winding up of the Commission did not take place till the end of 1950.

It is not really possible to give a simple answer to the question "What were the results of the Second International Polar Year?" The organization obtained a large number of coordinated observations over the surface of the earth, particularly in the Northern Hemisphere. The vast mass of figures and other findings do not, as in normal experimental physics, prove or disprove any particular theory. Instead they provide a large mass of data against which new ideas and hypotheses may be tested by the geophysicist working in his office. In some cases the observations do throw considerable light on the relationship between different phenomena and, to use our earlier example, sunspots, aurorae, magnetic storms and radio 'black-outs' for short-wave communication all appear to be connected.

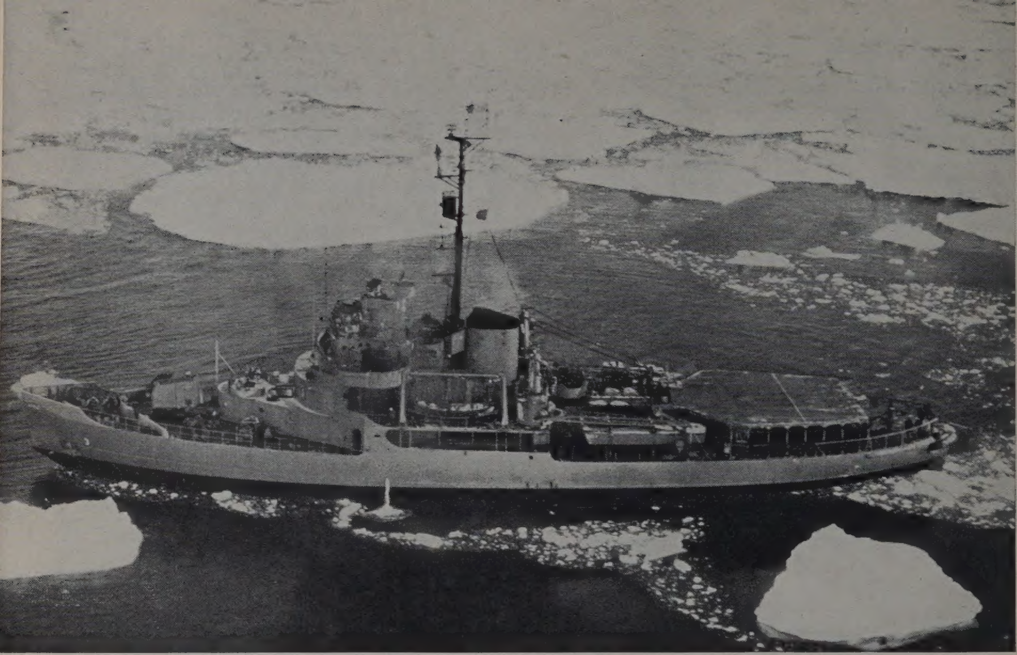
The connection is largely due to streams of electrically charged particles emitted from the region of sunspots, usually of relatively low speeds, which take some twenty hours to reach the earth. Occasionally high-speed particles called cosmic rays produce similar effects as happened last February. The difference between these two types of particle may be illustrated by the analogy of steel balls being rolled along a table towards a bar magnet. If a ball is rolled slowly it will be sucked in towards one of the ends (poles) of the magnet. If, however, a ball is sent at high speed towards the magnet it will hit anywhere along its length with little deflection from its original track. In the same way, charged particles with relatively low speeds approaching the earth are drawn in towards the Magnetic Poles, whereas the high-velocity particles may reach the earth at any latitude. On reaching the earth's atmosphere the low-velocity particles have a strong tendency to separate electrons from their parent atoms in the ionosphere, which in turn gives rise to electric discharge phenomena and changes in the magnetic field of the earth associated with such discharges. It is because these slow-moving particles, apparently connected with sunspots, are pulled towards the Magnetic Poles that the Polar regions form such a good area in which to study certain geophysical phenomena.

If a member of one of the parties engaged in the International Polar Year of 1882-3 could return to the Arctic regions today, several features would surprise him. The first would perhaps be the ease with which he could reach regions, almost inaccessible in 1882, by means of fast, comfortable aircraft. He would be amazed, and perhaps shocked, to learn that different countries were taking great precautions against military attacks across the Polar seas, and in fact used complicated and mysterious inventions to watch the skies at all times for strange aircraft by means of radio waves. The comfort and development of Arctic bases might seem to him a great improvement, although the lack of relative isolation might appear to be a disadvantage. The one thing certain to impress him would be the great improvement in scientific instruments and observations.

As an example, look at the changes that have taken place in the meteorological field. In 1882 the scientist in the Polar regions read instruments mounted in screens at his base to tell the temperature, pressure and humidity. He looked at the sky and noted the amounts and types of cloud present and perhaps made a visual estimate of their movement. During the Second Polar Year instruments were sent up on balloons which traced on a small sheet of material a record of the

Though observations for the International Geophysical Year are not due to begin until July 1957, complex scientific stations are already being set up in remote areas. The Royal Society Antarctic Expedition's base on the Weddell Sea coast is shown here when building commenced last January

Central Press Photos Ltd



courtesy of the U.S.I.S.

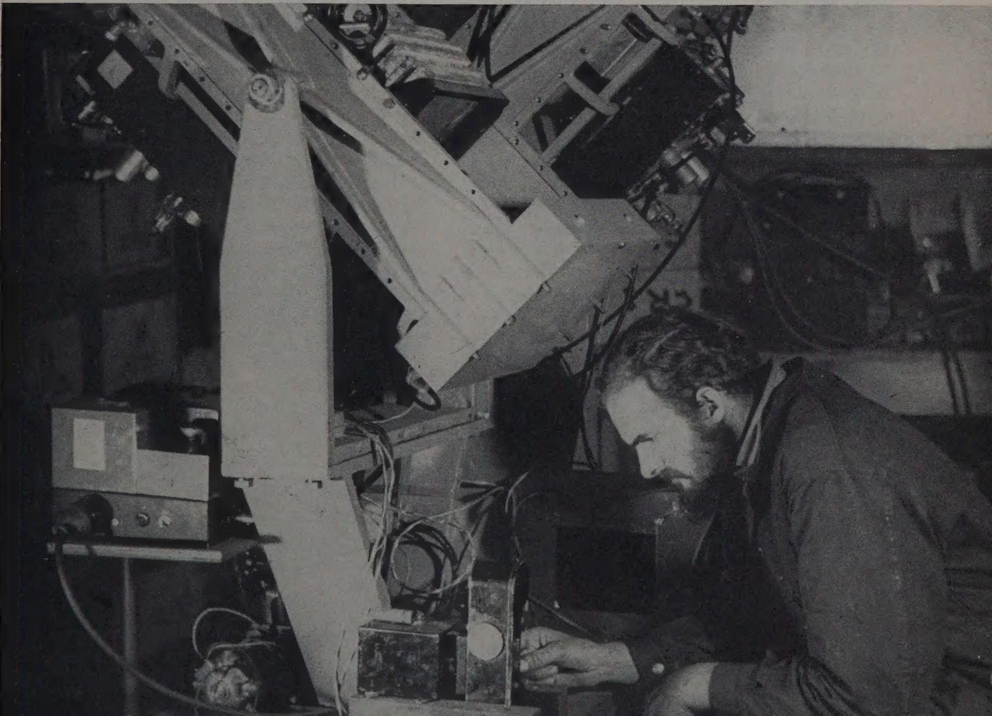
Among many nations taking part in the International Geophysical Year are the United States, whose ship U.S.S. Atka (above) *made a five-months' voyage to Antarctica last year, and the Soviet Union, whose Antarctic Expedition leader, Dr Somov, is seen* (below) *discussing plans with maritime experts*

courtesy of Soviet Weekly

By courtesy of Lieut Cdr W. J. L. Smith, D.S.O., R.N.

(Above) *The Lower Ferrar Glacier near McMurdo Sound. After reconnaissance last summer, New Zealand has decided to establish a base in this region.* (Below) *At the Australian station on Macquarie Island, cosmic ray equipment is used to study the direction of arrival of these high-velocity particles*

By courtesy of the A.N.A



temperature and pressure to considerable heights, but one was very lucky to recover an instrument after it had fallen to the ground many miles from the station where it was released. Upper winds were measured by following small balloons with a theodolite, but if the balloon entered a cloud the observation was finished. Present-day meteorologists, in contrast, release similar balloons and then sit at radio sets noting down the temperature, pressure and humidity at the balloon as an automatic radio-transmitter sends the information back to the earth. Similarly, another observer tracks the balloon by radar or follows it with a radio theodolite and measures the wind-speed by its movement irrespective of cloud or storm. In other fields also radio has revolutionized techniques of observation. Astronomers study radio waves coming in from outer space by large radio-telescopes and closer at hand they follow the trails of meteorites by use of radar techniques. In nearly every field new techniques of observation are providing wider opportunities for study.

In view of this greatly increased pace of scientific development over the previous two decades, it was scarcely surprising that in 1950 the proposal was made that a Third International Polar Year should be held twenty-five years after the second instead of leaving a gap of fifty years as formerly. The various international bodies concerned gave enthusiastic support to the project and a committee was set up under Professor Sydney Chapman of Great Britain to draw up detailed plans. Considerable financial help has been given to the secretariat by UNESCO. As the necessity to make world-wide, rather than purely Polar, observations in many spheres was evident, the project has changed its title to the International Geophysical Year and the planning Committee is known as the C.S.A.G.I. (Comité Spécial, Année Géophysique Internationale). The official period of observations will be from July 1, 1957, to December 31, 1958, and still more fields of research will be covered than in the earlier Polar Years.

On this occasion a planned network of stations will be concentrated in the Equatorial and Polar regions, and along several meridians of longitude through the Americas (70°W), Europe and Africa (10°E) and Asia and Australia (110°E and 140°E). For the first time a reasonably spaced network of stations will cover the Antarctic continent. During the Southern Hemisphere summer which has just finished, the U.S.A., the U.S.S.R., the United Kingdom, France and Australia have put advance parties on the Antarctic continent to establish new bases for the International Geophysical Year. These supplement stations already carrying out scientific investigations which are run by Australia, the United Kingdom, Argentina and Chile. Next summer Norway, New Zealand, Japan and possibly Spain and Belgium will also start to operate bases, while the U.S.A. and U.S.S.R. will for the first time establish large scientific stations of up to twenty men on the remote inland plateau of Antarctica. Such bases will only be practicable through use of modern and expensive techniques of transportation, coupled with the spirit of resource and determination which characterized former Polar explorers.

The spirit of the project is truly international, and may itself be of considerable help in creating understanding and mutual confidence between different sections of the world. As an example of this international cooperation one may mention an Antarctic conference held in Paris during July, 1955, on behalf of C.S.A.G.I. A Russian delegate arrived on the third day of the meeting, and announced the Soviet Union's plans to put three stations on the 110° E meridian in Antarctica: one on the coast, one half-way to the Pole and one at the Pole itself. When informed that the United States had already planned to put a station at the Pole, the delegate readily agreed to the suggestion of the conference that the third Russian station would be of much more value if placed about 80° S, 60° E—a location quite as difficult to reach as the Pole, though perhaps less prominent in the imagination of most people. At the next meeting of C.S.A.G.I. in Brussels this change in plans was confirmed by the delegation from the U.S.S.R.

Already headlines connected with the International Geophysical Year are appearing in the press as various projects are announced, and as different countries start to establish their bases in remote sections of Antarctica. The proposal to launch a space-satellite which will circle the earth in about an hour and a half at a height of some two hundred miles above the earth's surface has already captured the imagination of the public. Perhaps other aspects of the work such as the following resolution are indicative of better conditions throughout the world during coming years. "The C.S.A.G.I. resolves that all observational data to be exchanged in accordance with the I.G.Y. programme shall be available to scientists and scientific institutions in all countries."